

The AUTOMOBILE

United States Has 990,738 Cars

Increase in Registration of 266,670 Automobiles During First 9 Months of Current Year—Manufacturers Increase 163, or 38.8 Per Cent. and Dealers 3,463, or 26.2 Per Cent.

New York's Registration Passes 100,000 Mark—California Leads in New Cars With 24,526 and One Machine Per 28 Souls

SURPASSING all record of an industry which produces an intricate, sensitive and high-class mechanism and equaled only by the records of the producers of raw materials such as coal and steel, the automobile industry continues to keep its position among the principal lines of effort of the United States for the year 1912. In order to learn the present status of the automobile, its manufacture and trade in a quantitative way, THE AUTOMOBILE has arranged a detailed census. The objects of the latter were as follows: To obtain actual figures relative to the number of automobiles in use in the whole country and its several states, to the quantitative classification of these products under the heads of gasoline and electric pleasure and commercial cars; to obtain an exact knowledge of the fees contributed to the state treasuries by the automobilists of the United States; the number of manufacturers of each type of automobile in every state of the Union; and, likewise, the number of auto-

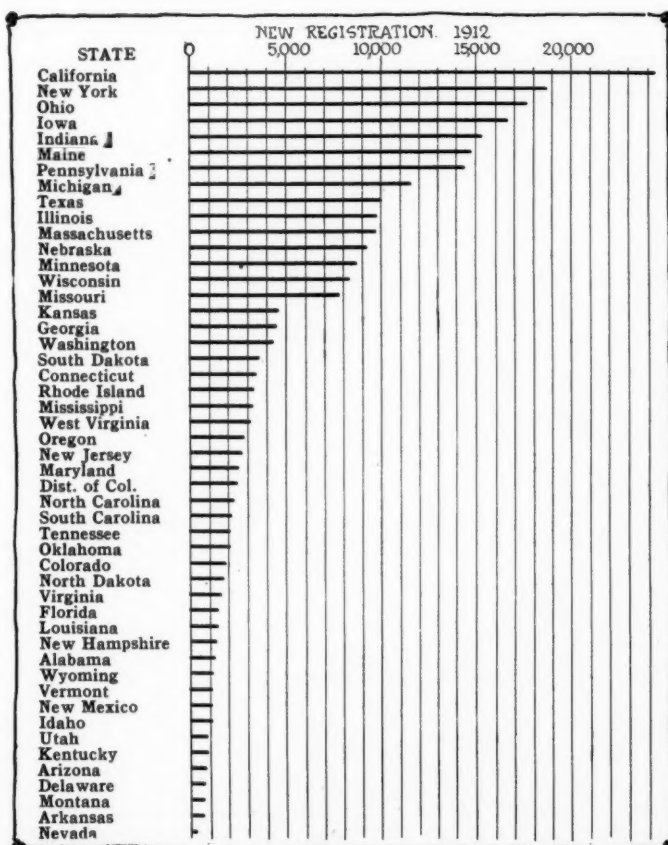
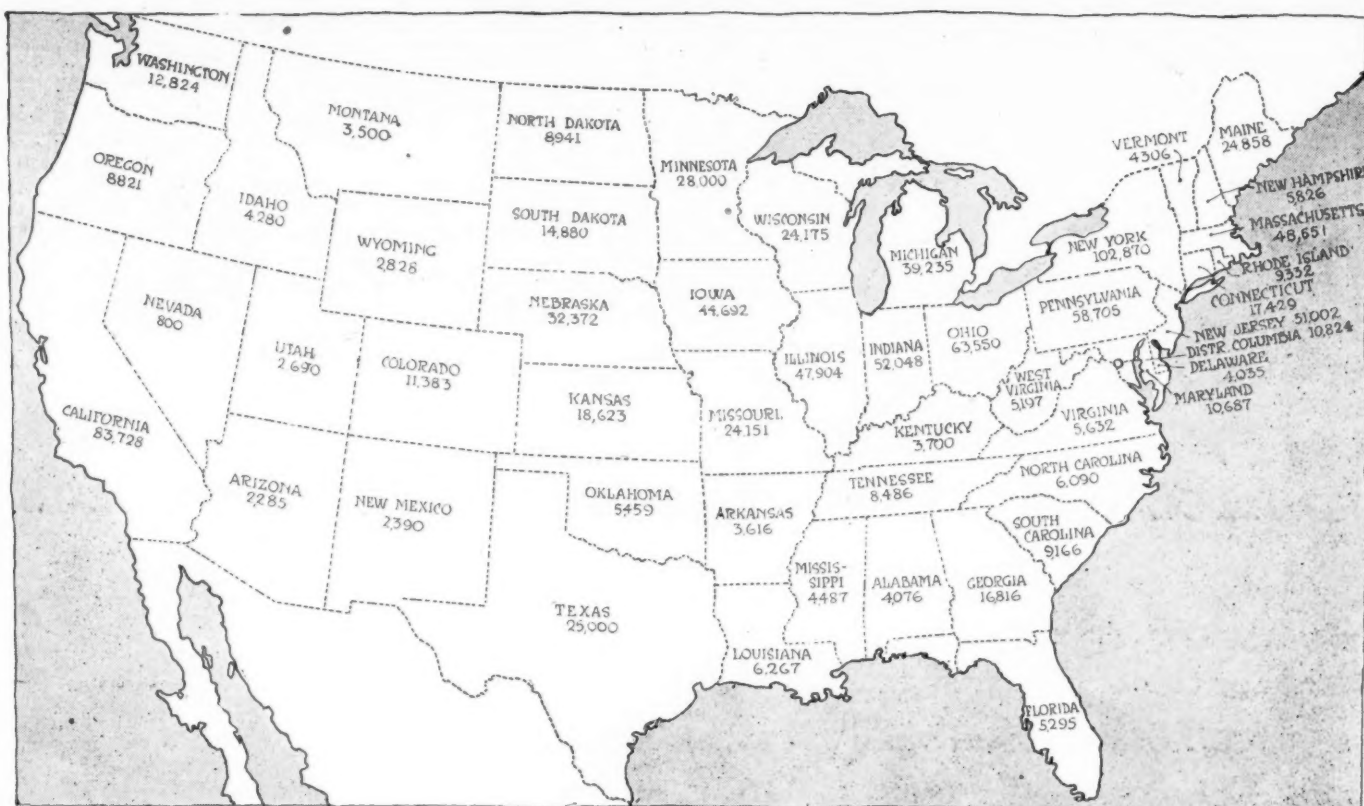


Diagram illustrating the respective gains in automobile registration up to October 1, 1912, throughout the various states of the Union over the number of cars registered during entire year of 1911

mobile and supply dealers, as well as garages and repair shops, all of which depend directly upon the automobile industry. The results of the census, which was carried out in a very painstaking manner, are as follows:

During the first 9 months of the present year, 275,293 automobiles were manufactured in the United States, and 266,670 of these were registered in the states and territories and in the District of Columbia. The total number of trucks made was 35,978, and that of electrics 33,842. The automobile owners of the Union paid to their secretaries of state or other registering officials a total of \$5,229,459.65 as license fees for their vehicles, while an average price of \$1,200 was paid in the purchase of the cars. The ratio of cars to the population is one car to every ninety-three residents of the country, if the results of the latest United States census is taken as the basis of such a calculation.

The total value of the cars registered in this country up to October 1 is \$1,188,885,600,



Map showing the registration of automobiles up to October 1, 1912, illustrating the distribution of cars throughout the various states

or \$12.98 per capita of the population. As to the distribution of automobiles in the various states, New York ranks first, being the only state in which there are more than 100,000 cars, but it is not gaining as rapidly as California, which is also making some progress as a manufacturing territory. While California leads in the actual maximum number of new registrations for 1912, West Virginia has the greatest per cent. gain, namely, 148. In regard to population per car, California is also in the lead, there being a car to every twenty-eight inhabitants.

A most careful census made to determine the present number of automobiles in the United States has led to the results which are compiled in the table on page 929 and the charts on pages 927 and 928. In order to obtain this information, THE AUTOMOBILE communicated with the secretaries of the various states and other state officials in charge of the registration of automobiles.

Tremendous Number of New Cars

There are at present 990,738 automobiles registered in the United States, including pleasure and commercial cars, of both the gasoline and electric type. Of these cars 920,918 are gasoline pleasure cars and 35,978 trucks, while 33,842 electric automobiles complete the total. Of this, 266,670 machines have been registered for the first time during the year 1912, in addition to the 724,068 automobiles in use last New Year, and this addition amounts to an increase of 36.8 per cent. on the latter basis. In other words, 26.9 per cent. of the automobiles used today throughout the Union have found purchasers since January 1 of this year. The commercial vehicles which numbered 25,451 last New Year have increased by 10,527, or 41.3 per cent., while of the 33,842 electrics now in use 5,550 have been added during the year, as a 20.4 per cent. increase. The 256,143 pleasure cars which comprise the addition to this class of vehicles during the first 9 months of this year represent an increase of 37 per cent. on the 692,494 cars in use on January 1.

Before dwelling on the distribution of cars in the various states, it might be well to illustrate these results by establishing a relation between the number of cars and the population of

the United States. Taking the last census, which gives the population as 91,572,266 as a basis, there is one automobile to every ninety-two inhabitants of the country, which means, if the value of an automobile is set at \$1,200 for the average, that there is \$12.95 worth of automobile to every inhabitant. The ratio of automobiles registered to the population forms another interesting method of comparison and one which demonstrates even more forcibly than the percentage tables the remarkable progress already made by the automobile industry in this country.

On page 930 the several states are tabulated with the population per car registered. In this table it will be seen that California takes the lead with one automobile to every twenty-eight people, a figure which brings home to the mind very directly the extent of adoption that the self-propelled vehicle has achieved. This figure is closely followed by Maine and the District of Columbia with thirty and thirty-one respectively of the population to each car registered. New York stands midway among the states in this table, having one car to every eighty-nine people, this being largely due to the dense slum population of the cities. West Virginia shows 236 people to each car, while Kentucky ends the table with 602, a great contrast to the states at the head.

The map on this page simply illustrates the total registration in the forty-nine states and territories, including the District of Columbia, the information being duplicate to the first column of the table on page 929.

The 990,738 automobiles registered in the United States have a total value of \$1,188,885,600, figuring the average price of each car as \$1,200. The registration fees paid on all these cars total \$5,229,459.65, or \$1 on every \$227.50 of car value, if the fees are looked upon in the light of taxation. Or, to express this fact in a different way an average taxation of \$5.28 upon each automobile is levied by its state. The average automobile taxation per capita of the population is 5.7 cents this year.

In the distribution of the automobiles registered, the Empire State leads all others, having passed the 100,000 mark several weeks ago. There are now in that state 102,870 cars, compared with 83,969 at the end of 1911, an increase of 18,901 machines. Despite this tremendous increase, this state ranks but second in

order of the magnitude of the additions, California being first with 24,526 new cars and a total of 83,728 automobiles. Great significance attaches to this fact, as it evidences the rapid economic progress of the population of the Golden State, a corroboration of which statement is found further below when the manufacture of automobiles in the various states is taken up. Then comes Ohio, being third in the number of cars registered with 63,550 machines, followed by Pennsylvania with 58,705, Indiana with 52,048, New Jersey with 50,112, Massachusetts with 48,651, Illinois with 47,904, Iowa with 44,692 and Michigan with 39,235. It is an interesting fact that the greatest automobile-producing state ranks but tenth in the number of cars owned by others than their manufacturers, although among the cars registered there are a great many used by the makers themselves.

The chart appearing on page 927 which illustrates the increase in the various states presents a vivid picture of how far California surpasses all others in this respect. New York, indeed, is second, but far behind the leader, and Ohio is third, Iowa, the ninth state in registration, is fourth in the order of gains, with 16,683 new cars registered during the past 9 months. Indiana, Maine and Pennsylvania all show increases of about 15,000 cars, while in Michigan only 11,439 automobiles have been added since the first of the year. Texas records a clean gain of 10,000 cars, being ninth and followed by Illinois, with 9,800 newly registered cars. Then follow the other states in order. New Jersey's increase of 2,762 cars is small, but may be explained by the new reciprocity law. Nevada is at the tail end of the line with only 280 new registrations, being incidentally the only state where there are less than 1,000 cars.

Perhaps the most amazing fact brought out in this investigation of automobile progress is the stupendous increase in registration of cars in West Virginia and Maine. The percentages of increase in these two states since January, 1912, are 148 and 147

respectively. These figures are almost incredible, especially that of West Virginia, which in July last registered only a 6.8 per cent. addition to the January figure. It follows, therefore, that this state has, in the short space of 3 months more than doubled its registration, a feat absolutely surpassing anything of this character in the history of the industry.

Increase Uniform in Most States

Referring to the table on page 930, it will be seen that the third place is occupied by New Mexico with an increase of 72.5 per cent. less than one-half of the preceding figures, a fact which further emphasizes the remarkable character of the increase in the two states at the head of the list. Then follows Texas with 64.2 and so on down the list with gradually decreasing figures to Colorado, which shows an addition of 20 per cent. since January to the present time. The final figure, 5.7 per cent., representing New Jersey needs special consideration, as, owing to the laws respecting registration in this state which were in force up to the end of last year, this percentage has not a parallel significance with the rest of the table. To obtain a correct impression of the increase in New Jersey it would be necessary to take the number of cars registered during 1912 and calculate the ratio with the number of native New Jersey cars previously registered. But this latter figure is unobtainable and it is therefore necessary to estimate on the total registration up to the end of 1911, a large proportion of which figure consists of the registrations of cars belonging to New York and the neighboring states. On July last the number of native New Jersey automobiles registered since the beginning of the year, although considerable, was not sufficient to render the percentage here dealt with a positive figure, showing actually a decrease of 11.7 per cent. from the 1911 registration. That this figure has been wiped out and supplanted by a positive increase of 5.7 per cent. will

Automobile Registrations in the United States up to October 1, 1912, Together with the Amount of Fees Collected

State or Territory	Total Registration	New Registration 1912	Registration up to 1912	Commercial Vehicle Registration	Electric Car Registration	Registration Fees for 1912	Remarks
Alabama	4,076	1,220	2,856	26	53	\$64,502.00	New law
Arizona†	2,285	800	1,485	30	43	11,425.00	New law
Arkansas	3,616	750	2,866	33	38	18,080.00	
California	83,728	24,526	59,202	3,300	2,600	56,461.50	
Colorado†	11,383	1,900	9,483	32	175	244,274.38	Local registration
Connecticut*	17,429	3,429	14,000	600	500	17,567.00	
Delaware	2,035	784	1,251	95	85	3,780.00	Perennial registration
District of Columbia*	10,824	2,502	8,322	230	276	2,812.00	Perennial registration
Florida	5,295	1,406	3,889	120	75	8,896.00	
Georgia	16,816	4,448	12,368	216	325		No state registration
Idaho†	4,280	1,000	3,280	50	55	311,120.00	
Illinois†	47,904	9,800	38,104	2,200	1,850	52,048.00	
Indiana	52,048	15,222	36,826			299,691.05	
Iowa	44,692	16,683	28,009	1,300	1,148	Taxation	
Kansas	18,623	4,623	14,000	250	300		No state registration
Kentucky	3,718	832	2,886	135	50		
Louisiana†	6,467	1,400	5,067	60	50		Local registration
Maine	24,858	14,813	10,045	498	202	97,489.68	Perennial registration
Maryland*	10,687	2,587	8,100	700	300	92,000.00	
Massachusetts	48,651	9,744	38,907	3,320	2,900	567,733.67	
Michigan	39,235	11,439	27,796	1,500	1,500	132,330.00	
Minnesota	28,000	8,725	19,275	1,300	1,300	51,300.00	
Mississippi	4,487	3,247	1,240	50	30	37,000.00	
Missouri	24,151	7,985	16,166	676	965	116,530.00	
Montana†	3,500	771	2,729	45	55		No state registration
Nebraska	32,372	9,278	23,094	600	725	18,556.00	
Nevada†	800	280	520	27	16		No state registration
New Hampshire	5,826	1,326	4,500	95	85	102,886.00	
New Jersey	51,022	2,762	48,260	1,250	1,600	453,804.27	New law
New Mexico	2,390	1,001	1,389			4,411.00	No state registration
New York	102,870	18,901	83,969	9,118	7,000	1,019,309.25	
North Carolina	6,090	2,362	3,728	100	90	25,545.00	
North Dakota	8,941	1,721	7,220	100	110	26,823.00	
Ohio	63,550	17,762	45,788	1,500	3,186	320,946.25	
Oklahoma	5,459	2,000	3,459	80	75	27,295.00	
Oregon	8,821	2,814	6,007	200	225	42,289.00	
Pennsylvania	58,705	14,433	44,272	3,000	2,800	582,393.87	
Rhode Island	9,332	3,315	6,017	432	250	102,142.00	
South Carolina†	9,166	2,100	7,066	150	200		Local registration
South Dakota	14,880	3,638	11,242	200	175	5,864.00	Perennial registration
Tennessee	8,486	2,022	6,464	150		9,508.00	
Texas†	25,588	10,000	15,588	700	800		Local registration
Utah	2,690	870	1,820	50	45		
Vermont	4,306	1,052	3,254	100	120	79,547.37	
Virginia	5,632	1,612	4,020	200	200	46,166.85	
Washington	12,824	4,235	8,589	210	175	25,648.00	
West Virginia	5,197	3,106	2,091	105	65	30,309.51	Perennial registration
Wisconsin	24,175	8,344	15,831	800	1,000	120,975.00	New law
Wyoming	2,828	1,100	1,728	45	25		Local registration
	990,738	266,670	724,068	35,978	33,842	\$5,229,459.65	

*Including non-residents.

†Estimated on basis of population with reference to location and sectional registration.

PERCENTAGE OF INCREASE IN REGISTRATION

West Virginia.....	148
Maine.....	147
New Mexico.....	72.5
Texas.....	64.2
Wyoming.....	63.7
North Carolina.....	63.4
Delaware.....	62.5
Iowa.....	59.5
Oklahoma.....	58
Rhode Island.....	55.1
Arizona.....	54
Nevada.....	54
Wisconsin.....	52.6
Missouri.....	49.3
Washington.....	49
Utah.....	47.8
Oregon.....	46.5
Minnesota.....	45.3
Alabama.....	42.5
California.....	41.5
Indiana.....	41.3
Michigan.....	41.3
Nebraska.....	40
Virginia.....	40
Ohio.....	39
Florida.....	36.2
Georgia.....	35.3
Kansas.....	33
Nevada.....	32.6
Pennsylvania.....	32.4
Vermont.....	32.3
South Dakota.....	32
Maryland.....	31.3
Tennessee.....	31.3
Idaho.....	30.5
District of Columbia.....	30
South Carolina.....	29.8
New Hampshire.....	29.5
Kentucky.....	28.8
Montana.....	28.2
Louisiana.....	27.6
Mississippi.....	26.2
Arkansas.....	26.2
Illinois.....	25.7
Massachusetts.....	25
Connecticut.....	24.5
North Dakota.....	23.8
New York.....	23.5
Colorado.....	20
New Jersey.....	5.7

PER CAPITA DISTRIBUTION OF AUTOMOBILES

California.....	28
Maine.....	30
District of Columbia.....	31
Nebraska.....	37
South Dakota.....	39
Iowa.....	50
New Jersey.....	50
Delaware.....	50
Indiana.....	52
Wyoming.....	52
Rhode Island.....	58
Colorado.....	63
Connecticut.....	64
North Dakota.....	65
Massachusetts.....	69
Michigan.....	72
New Hampshire.....	74
Minnesota.....	74
Ohio.....	75
Oregon.....	76
Idaho.....	76
Vermont.....	83
Washington.....	85
New York.....	89
Arizona.....	90
Kansas.....	91
Wisconsin.....	96
Nevada.....	102
Montana.....	107
Illinois.....	117
Maryland.....	121
Pennsylvania.....	130
Missouri.....	136
New Mexico.....	137
Utah.....	139
Florida.....	142
Georgia.....	155
Texas.....	156
South Carolina.....	164
West Virginia.....	236
Louisiana.....	265
Tennessee.....	265
Oklahoma.....	302
North Carolina.....	364
Virginia.....	367
Mississippi.....	400
Arkansas.....	436
Alabama.....	525
Kentucky.....	602

Distribution of Dealers, Garages, Repair Shops and Supply Houses

	Dealers	Garages	Supplies	Repairs	Total, Sept. 30, 1912	Total, Jan. 1, 1912
Alabama.....	62	33	...	4	79	54
Arizona.....	35	20	2	1	46	34
Arkansas.....	38	20	...	2	46	30
California.....	717	467	24	50	945	692
Colorado.....	114	94	5	5	158	141
Connecticut.....	293	249	8	25	409	286
Delaware.....	33	22	...	3	37	35
Dis. of Columbia.....	65	30	6	12	101	78
Florida.....	135	80	...	4	156	102
Georgia.....	184	94	5	7	228	151
Idaho.....	46	27	1	...	49	34
Illinois.....	793	664	32	55	1,230	1,001
Indiana.....	472	335	10	27	611	480
Indian Territory.....	...	...	...	...	...	...
Iowa.....	678	465	1	20	860	608
Kansas.....	360	244	5	10	343	299
Kentucky.....	102	63	4	5	120	102
Louisiana.....	74	38	1	4	83	67
Maine.....	148	122	1	10	98	116
Maryland.....	105	68	7	5	129	96
Massachusetts.....	551	523	38	75	932	729
Michigan.....	468	311	22	23	493	460
Minnesota.....	443	218	14	22	532	363
Mississippi.....	48	32	1	3	84	52
Missouri.....	422	213	18	56	566	437
Montana.....	99	57	1	1	115	73
Nebraska.....	347	192	6	5	388	245
Nevada.....	23	10	...	2	27	9
New Hampshire.....	102	90	1	7	141	92
New Jersey.....	461	532	11	31	764	493
New Mexico.....	24	22	...	...	29	24
New York.....	1,301	1,230	100	118	2,057	1,696
North Carolina.....	93	60	1	8	112	69
North Dakota.....	179	97	...	2	210	145
Ohio.....	721	488	25	45	932	732
Oklahoma.....	91	63	2	7	135	112
Oregon.....	114	79	9	7	151	120
Pennsylvania.....	772	539	32	63	1,097	903
Rhode Island.....	80	84	5	16	142	118
South Carolina.....	98	62	2	5	118	85
South Dakota.....	146	87	1	4	168	111
Tennessee.....	111	50	2	7	124	86
Texas.....	275	122	5	17	332	308
Utah.....	30	14	2	5	40	25
Vermont.....	82	62	...	6	103	89
Virginia.....	123	71	3	7	148	105
Washington.....	165	81	8	12	208	170
West Virginia.....	71	36	...	1	81	60
Wisconsin.....	350	277	8	26	459	364
Wyoming.....	21	15	...	2	25	19
W. Ind.....	1	1	...	...	2	2
Canada.....	282	225	10	7	337	167
Mexico.....	11	7	...	1	14	9
Hawaii.....	1	...	...	...	1	1
	12,066	8,901	538	731	16,708	13,245

convey some idea of the sharp upward trend of the registration of native cars in New Jersey.

A short review of the development of the automobile industry as measured by its output, since its infancy, might prove of interest. The following table shows how the manufacture of motor cars has grown from year to year, and how the production increased, at times at a moderate rate and then again with tremendous vigor:

Year	Cars built	Increase over past year	Per cent increase
1903.....	9,000	...	...
1904.....	12,000	3,000	33.33
1905.....	22,500	10,000	83.96
1906.....	30,000	7,500	33.33
1907.....	39,000	9,000	30.00
1908.....	50,000	11,000	28.67
1909.....	108,000	58,000	116.30
1910.....	173,000	65,000	60.25
1911.....	200,000	27,000	15.62
1912.....	340,000	140,000	41.20

The production figure for the year 1912 is estimated on the basis offered by the production figures now on hand, which would indicate that during the entire year 1912 about 320,000 new cars will be registered in the United States. A moderate estimate of the total exports for this current year would add 20,000 to the above number. This indicates that 1912 is one of the best years of the industry. Not only is the production increase of 140,000 cars absolutely unprecedented but the rate of increase is far ahead of that of every other industry.

As regards the manufacture of automobiles and motors, the census showed that there are 575 distinct manufacturing companies in the United States, quite a few of which operate more than one plant. As is shown in the table appearing herewith, fully 100 makers, or 17.4 per cent. of the total, are located in Michigan, which is still holding its own as the leading automobile-producing state. Second in magnitude ranks New York, having seventy-eight makers, while Ohio, with sixty-eight manufacturers, is third and Indiana with fifty-nine, is fourth. Pennsylvania has forty-one manufacturers, Illinois thirty-seven, Wisconsin, thirty-two and New Jersey, nineteen. The rate of increase is also greatest in Michigan and New York, there being

twenty-four new makers in Michigan and thirty-three in New York, during the past year, or a gain of 31.6 per cent. in the Wolverine State and 73.25 per cent. in the Empire State.

On the other hand, the industry has fallen off in several states, prime among which is Iowa, where a 50 per cent. reduction has taken place, decreasing the number of makers from six to three. Connecticut has fallen off from nine to seven makers and the District of Columbia, Kansas, Kentucky, Tennessee and Virginia have each lost one factory. But the total difference between last November and this is still positive, there being an increase of 163 over the total number of manufacturers, which then was 420. This increase is equal to 38.8 per cent.

Of special interest is the increase in freight automobiles during the past years. The manufacture of commercial vehicles now and 1 year ago is best illustrated by the following figures:

Year	Makers of pleasure cars	Makers of commercial cars
1911	237	198
1912	286	312
Increase	49	114

Of course, this tabulation includes manufacturers who make both pleasure and commercial cars, but the effect on the number of each of these lines of products is the same.

Similar progress has been made in the number of garages and dealers, not only in the United States, but also in Canada, Mexico, the West Indies and Hawaii as shown on page 930. Such establishments have increased 26.2 per cent. in number since the beginning of the year and are doing a flourishing business, and despite the complaints which at times come from these quarters, hard facts as represented by figures show that these branches of the trade are undergoing an expansion fully as remarkable as that of the automobile industry proper. This statement is supported by the table on page 930 and the chart on the opposite page which illustrates its figures. As to the total numbers of such establishments in the various states, New York is far ahead of the next state, Illinois, the former having 2,057 against 1,230 of the latter. Pennsylvania follows with 1,097 and California with 945 is fourth, Ohio and Massachusetts with 932 each ranging closely after it. Iowa, New Jersey and Indiana follow, with 860, 764 and 611 places respectively. New York's total increase of 361 establishments again heads the list of gains, followed by New Jersey's 271 and California's 258.

Manufacturers' Distribution of Automobiles, Trucks and Motors

	Automobiles	Commercial Vehicles	Motors	Total
Alabama	1			1
Arizona				
Arkansas				
California	5	5		9
Colorado	2	2		3
Connecticut	4	5		7
Delaware				
District of Columbia	1	1		2
Florida	2	1		3
Georgia				
Idaho	23	29	13	37
Illinois	38	17	11	59
Indiana	4	5	1	9
Indian Territory	1			1
Iowa	1	3		4
Kansas				
Kentucky				
Louisiana				
Maine				
Maryland	4	3		4
Massachusetts	12	9		19
Michigan	54	48	10	100
Minnesota	5	10	1	14
Mississippi				
Missouri	7	6		11
Montana				
Nebraska	3	2		4
Nevada				
New Hampshire				
New Jersey	5	13	1	19
New Mexico				
New York	26	44	13	78
North Carolina	1			1
North Dakota				
Ohio	34	44	6	68
Oklahoma	1	1		2
Oregon				
Pennsylvania	18	25	5	41
Rhode Island	2	3	1	5
South Carolina				
South Dakota	1	1		1
Tennessee	3	1		3
Texas	1	2		2
Utah				
Vermont				
Virginia	1	2		2
Washington				
West Virginia	1	3		4
Wisconsin	11	17	9	32
Wyoming				
W. Ind.				
Canada	14	10	2	21
Mexico				
Hawaii				
Total	286	312	62	575

NOTE:—Where manufacturers build both pleasure cars and trucks they are listed under each head, but allowance is made in the total.

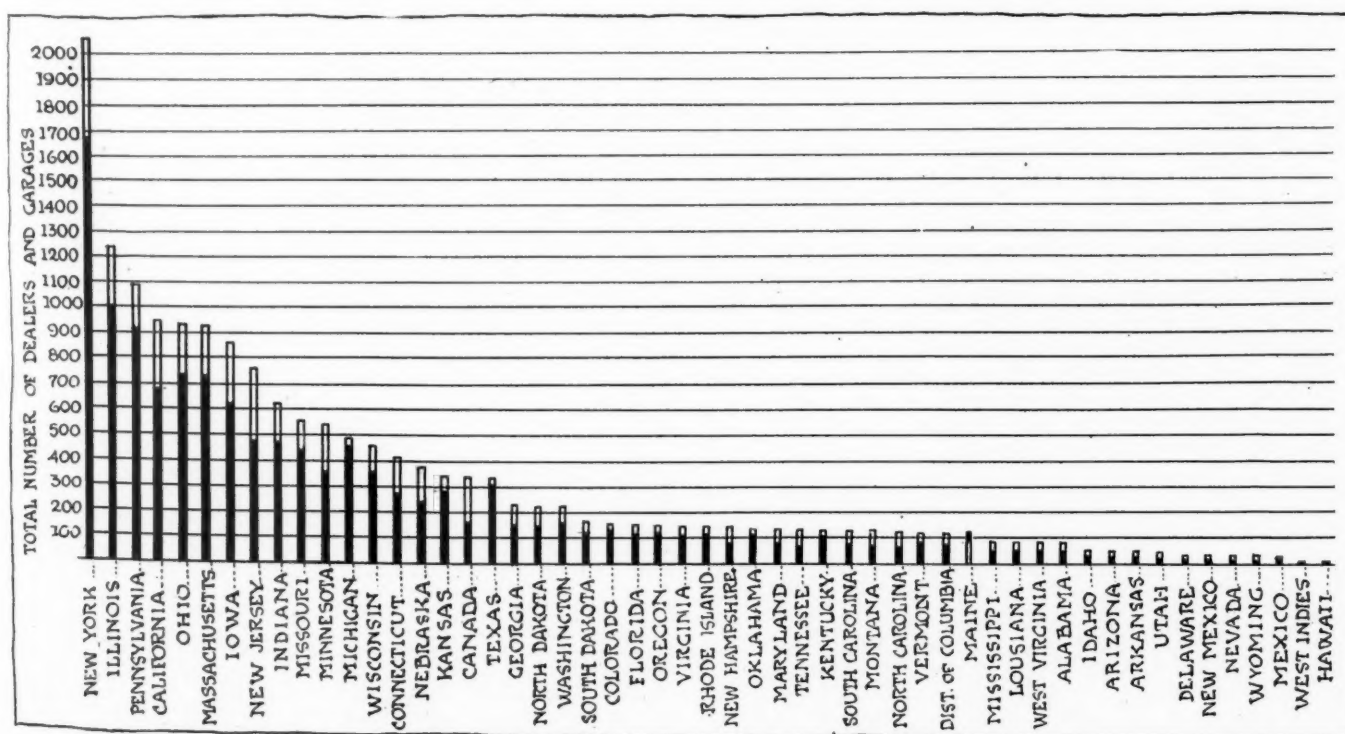


Diagram showing distribution of dealers and garages in the United States, Canada, Mexico, West Indies and Hawaii

I. C. C. Warns Railroads

Commission Serves Notice That Reform Must Be Instituted To Relieve the Car Shortage Situation

Wheeler Buys Out Schebler—Crude Rubber Down Again
—Other News Notes of the Automobile Industry

GOOD news for the industry was contained in the optimistic statements issued by numerous representative railway officials as to the alleviation of the shortage of freight cars and the prospect for an adequate supply by the time the automobile shipping season begins. The net shortage up to November 2 was more than 40,000, but to the gratification of the automobile industry it is announced that the exceedingly heavy movement of grain during October has brought forward the peak of the railroad load so that it will probably be passed before the end of November. The total net shortage is 12,881 more than reported at the last fortnightly period. Presidents of the Atchison, Wabash, Illinois Central, Northwestern and Great Northern report full traffic but little congestion. The New York Central and Erie have more than they can handle, but both roads are hopeful about cleaning up in a few days.

The fine weather for shipping during the past 6 weeks is generally given as the reason for the degree of facility with which the situation has been handled. If the weather continues good through November and fairly good in December, the traffic problem will be normal during the automobile shipping season, according to railroad officials.

What amounts to unofficial notice has been served upon the railways of the United States by the Interstate Commerce Commission that the railways must adjust the present arrangements concerning the prompt return of freight cars that have been diverted from their own companies. Franklin K. Lane, of the commission, calls attention to the fact that it is little less than stealing for one railroad to withhold and use the cars of another railroad, particularly during periods of stress like that noted in the present grain movement.

The commission has issued a circular to the railroads to increase the speed of freight trains and calling attention to the fact that 25 miles a day is too small an average movement for freight cars. Another recommendation is for a higher per diem demurrage charge so that poorly equipped companies will have less motive for withholding the cars of better equipped roads.

James S. Marvin, traffic manager of the N. A. A. M., has a statement from one railroad which has 175 automobile cars, showing that on November 1 the company had only sixteen of the cars in service on its own lines. The remainder, 159 cars, were being used by other roads, needless to say that their service is not in the shipment of automobiles.

The attitude of the Interstate Commerce Commission is simply that it insists that the railroads remedy an inexcusable situation themselves or else the commission will take jurisdiction.

It is estimated that the total net shortage of cars at the peak of the load will be not more than 50,000.

Wheeler Buys Out Schebler

INDIANAPOLIS, IND., Nov. 4—Frank H. Wheeler has bought out the interest of his partner, George M. Schebler, in the firm of Wheeler & Schebler, manufacturers of the Schebler carbureter. The business will be continued by Mr. Wheeler without a change in firm name, Mr. Wheeler to be sole owner. The consideration has not been made public.

The growth of the company, which has been conducted as a partnership, has been almost phenomenal. Mr. Schebler, who

was a mechanic in moderate circumstances, brought out the Schebler carbureter and found himself without sufficient capital to develop and manufacture his invention. Mr. Wheeler became associated with him, and the two started in an extremely modest way in small quarters on the second floor of a building in North Alabama street.

In a remarkably short time the business outgrew its quarters and it was found necessary to erect the enormous plant that is now operated on the south side of the city. This plant is said to be one of the largest of its kind in the world.

Mr. Schebler has been obliged to retire from the firm on account of ill health. He may devote most of the next few months to traveling, in the hope of improving his health. His physicians have advised him for some time that he must retire from business.

Crude Rubber Continues to Sag

Crude rubber was easier again in the world's markets during the past week. The price level sagged to a basis of \$1.01 1-2 for up-river fine and was steady in the plantation grades, pale crêpe standing at \$1.02 1-2. While actual sales amounted to practically normal volume of business there was little selling pressure and less active bidding. Receipts continue to increase from both plantations and indigenous fields.

Receivers Framing Maxwell Schedule

The manufacturing schedule of the Maxwell-Briscoe Motor Company for 1913 is being framed in accordance with the action of the United States District Court, which authorized the issuance of \$1,500,000 of receivers' certificates to finance the undertaking.

Automobile Securities Quotations

SPECULATION and investment in automobile securities marked time throughout the past week, while the tire companies monopolized the center of attention. Goodyear sold ex-dividend and so did Goodrich. Ajax-Grieb, which is now closely held, was marked up sharply on small trading. Firestone bulged up and then came back and Miller and Swinehart each went up and stayed up. International seems to have turned the corner and is on the up-grade again. The automobile list was steady as a general thing. The following tabulation shows the current level compared with that a year ago.

	1911		1912	
	Bid	Asked	Bid	Asked
Ajax-Grieb Rubber Co., com.....	..	..	170	200
Ajax-Grieb Rubber Co., pfd.....	..	..	97	100
Aluminum Castings, pfd.....	..	..	100	102
American Locomotive, com.....	35	35½	43½	44
American Locomotive, pfd.....	103	103½	106	106½
Chalmers Motor Company.....	..	..	145	152
Consolidated Rubber Tire Co., com.....	7	10	11½	15
Consolidated Rubber Tire Co., pfd.....	10	20	50	55
Firestone Tire & Rubber Co., com.....	170	176	278	282
Firestone Tire & Rubber Co., pfd.....	106	108	105	107
Garford Company, preferred.....	..	..	99	101
General Motors Co., common.....	38	39	34½	35½
General Motors Co., preferred.....	77½	78½	77½	78½
B. F. Goodrich Co., common.....	*234	*238	†270	†271
B. F. Goodrich Co., preferred.....	*118	*120	†107	†107½
Goodyear Tire & Rubber Co., com.....	225	235	†368	374
Goodyear Tire & Rubber Co., pfd.....	104	106½	104½	105½
Hayes Manufacturing Company.....	..	..	..	90
International Motor Co., com.....	..	..	19	21
International Motor Co., pfd.....	..	..	74	76½
Lozier Motor Company.....	..	..	40	50
Miller Rubber Company.....	..	..	143	147
Packard Motor Car Co., pfd.....	104½	106	105½	107
Peerless Motor Company.....	..	..	115	120
Pope Manufacturing Co., com.....	40	48	28	30
Pope Manufacturing Co., pfd.....	65	70	69	71
Reo Motor Truck Company.....	8	10	8	10
Reo Motor Car Company.....	23½	25	19	22
Studebaker Company, common.....	..	..	42	42½
Studebaker Company, preferred.....	..	..	94½	95½
Swinehart Tire Company.....	..	..	99	101
Rubber Goods Mfg. Co., com.....	85	95	100	..
Rubber Goods Mfg. Co., pfd.....	100	105	104	108
U. S. Motor Company, com.....	23	25	¾	¾
U. S. Motor Company, pfd.....	67½	68½	1½	2
White Company, preferred.....	..	..	105	108

*Old. †New. ‡Ex-div.

Progress was reported by the officers who have the work in hand but no inkling of its scope has been made public. The whole enterprise is a temporary expedient for the purpose of advancing the work so that it will be possible to turn out Maxwell cars for 1913 at the beginning of the marketing season.

The sale of the property to a reorganizing corporation and the continuance of its activities so that a sale can be made on a better basis than scrap are said to be the immediate objects to be attained.

The deal with the Flanders Motor Company remains in a state of uncertainty. It has been announced at United States Motor headquarters that appraisements have been made on each side and that agreement as to terms is a matter of negotiation. It was positively stated that no official development would be announced prior to November 11, when the form of the decree of sale will be discussed before Judge Hough.

In the meantime the outstanding stocks of the parent corporation and the claims of the creditors are being deposited with the Central Trust Company and it is said that the total of claims now deposited amounts to nearly 75 per cent.

A. B. of T. Holds Monthly Meeting

The regular monthly meeting of the Automobile Board of Trade was held Wednesday morning according to schedule. On account of the election a small attendance was present and the program contained nothing but matters of routine. The Board of Trade meeting had been tentatively scheduled to be held in Detroit next week when the National Association of Automobile Manufacturers assembles for a quarterly session, but it was decided that the merger matter and other important business had not progressed sufficiently at this time to warrant such a proceeding.

Market Changes for the Week

FEW materials changed their prices during the past week despite the fact that a satisfactory degree of activity prevailed throughout the market. Tire scrap rose \$.00 1-4, due to trading conditions. Lead dropped \$.25 per 100 pounds and copper electric rose \$.00 1-8. Rubber experienced a slight lowering in price, owing to lack of trade, closing at \$1.02 at a loss of \$.01. Tin, beams and channels, gasoline, Bessemer and open hearth steel remained constant throughout the week. Cottonseed oil rose to \$.79 and then dropped to \$.76, experiencing a loss of \$.04. Rapeseed oil rose \$.01. Sulphuric acid and cyanide of potash remained unchanged.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Change
Antimony, per lb.	.09 1/4	.09 1/4	.09 1/4	.09 1/4	.09 1/4	.09 1/4	.....
Beams & Channels, 100 lbs...	1.61	1.61	1.61	1.61	1.61	1.61	.....
Bessemer Steel, ton	28.00	28.00	28.00	28.00	28.00	28.00	.....
Copper Elec., lb.	.17 1/8	.17 1/8	.17 3/8	.17 3/8	.17 3/8	.17 1/4	+ .00 1/4
Copper, Lake, lb.	.17 3/8	.17 3/8	.17 3/8	.17 3/8	.17 3/8	.17 3/8	.....
Cottonseed Oil, October, bbl.	5.80	5.79	5.76	5.76	5.76	5.76	— .04
Cyanide Potash, lb.	.19	.19	.19	.19	.19	.19	.....
Fish Oil (Menhaden)	.33	.33	.33	.33	.33	.33	.....
Gasoline, Auto, 200 gals. @	.21	.21	.21	.21	.21	.21	.....
Lard Oil, prime	.88	.90	.90	.90	.90	.90	+ .02
Lead, 100 lbs.	5.00	5.00	4.95	4.95	4.90	4.75	— .25
Linseed Oil	.58	.58	.58	.58	.58	.58	.....
Open-Hearth Steel, ton	29.00	29.00	29.00	29.00	29.00	29.00	.....
Petroleum, bbl., Kansas crude	.70	.70	.70	.70	.70	.70	.....
Petroleum, bbl., Pa. crude	1.65	1.65	1.65	1.65	1.65	1.65	.....
Rapeseed Oil, refined	.68	.69	.69	.69	.69	.69	+ .01
Rubber, Fine	1.03	1.03	1.03	1.03	1.03	1.02	— .01
Up-river Para.	4.40	4.40	4.40	4.40	4.40	4.40	.....
Silk, raw Ital.	3.95	3.95	3.95	3.95	3.95	3.95	.....
Silk, raw Japan	3.95	3.95	3.95	3.95	3.95	3.95	.....
Sulphuric Acid, 60 Beaumé	.99	.99	.99	.99	.99	.99	.....
Tin, 10 lbs.	5.02	5.02	5.04	5.03	5.04	5.02	.....
Tire Scrap	.09 1/4	.09 1/4	.09 3/4	.09 3/4	.09 3/4	.09 3/4	.00 1/4

Dynamo Patents In Test

General Electric Company Sues Rushmore for Alleged Infringement of Winding and Regulating Rights

Defense Will Set Up Rushmore's Own Patent as a Bar to the Action and Technical Battle Impends

TRENTON, N. J., Nov. 4.—Suit has been entered in the United States District Court for the District of New Jersey by the General Electric Company against the Rushmore Dynamo Works charging infringements of the Barry and Steinmetz patents, numbers 884,555 and 713,523, which are alleged to cover certain principles of winding and regulating electric dynamos involved in the electric lighting and starting systems used in the automobile art.

The Rushmore company has proceeded on the principle that patent 1,016,037, granted to Samuel W. Rushmore, Jan. 30, 1912, for an electric lighting system for automobiles does not infringe the rights of the complainant's patents.

The suit has been started but the matter is not likely to come to an issue before the middle of January and may not be heard before vacation in 1913, although this is by no means certain.

The Barry patent was granted April 14, 1908, and is for a system of regulating dynamo electric machines. The chief element of the idea is its provision for limiting maximum voltage of the generator, irrespective of its speed or load. The device was primarily intended to cover generators driven from the axles of railway cars, but the principle is said to cover automobiles as well. In accomplishing the object the inventor resorts to two windings with a system of balances to control the voltage.

The Steinmetz patent was granted for a compound wound generator, November 11, 1902. It covers a method of compensating for the variation in voltage due to variation in permeability of the magnetic circuit. This is accomplished by automatic compensation; diverting current from a field coil; using parallel circuits; two magnetomotive forces and by passing current through a field coil.

On behalf of the defense it is stated by Mr. Rushmore that the Rushmore patent, granted specifically for an electric lighting system on vehicles, does not infringe either of the other patents cited in suit. The dynamo is driven from the propelling axle or engine at widely differing rates of speed. In order to prevent the burning out of the lamps when the voltage is high, due to the high rate of speed of the propelling mechanism, or the destruction of the storage battery from overloading, some system of compensation is required. Rushmore's invention consists essentially of a ballast coil made of iron or other metal having a high positive resistance temperature coefficient when heated and so arranging the various parts that sudden rises in voltage and consequent rushes of current are opposed by the ballast coil, proportionately to the rises in voltage, and the fluctuations are absorbed by the battery.

According to the statement of Mr. Rushmore his patent was granted after a close scrutiny and familiarity with the prior art and the claims of his patent were drawn by Dr. Albert F. Ganz, of Stevens, and George Cooper Dean, electrical and patent law expert.

In commenting on the Barry and Steinmetz patents, Mr. Rushmore says that in the Barry device it is attempted to control the voltage of the dynamo irrespective of current output, with individual ballasts to protect each lamp. The Steinmetz patent seeks merely to compensate for variation in magnetic permeability of his dynamo when driven at constant speeds in order to maintain constant voltage at widely varying loads, according to Mr. Rushmore.

M.A.D.A. Preparing To Pay Its Creditors

**Asks Extension Until March so That
Profits of Show May be Applied
To Racing Debts**

**Daimler Company Aggressive in Enforcing Patent Rights of
Licensees But Inactive as Trade at Large**

MILWAUKEE, WIS., Nov. 4—A plan whereby every creditor of the Automobile Dealers' Association, promoter of the 1912 international road races at Milwaukee on October 2, 3 and 5, will be paid dollar for dollar, is now being brought to consummation by the association's committee in charge of financing the \$43,000 deficit incurred by the conduct of the speed carnival. The basis of the plan is to extend the time of payments until March 1, 1913, and the arrangement is contingent upon the acceptance of it by at least 90 per cent. of the creditors. In the meantime the association will be able to earn sufficient funds to cover the entire deficit, it is stated. The annual motor show will be held under auspices and management of the M. A. D. A. some time in January and is always the source of a neat profit, which will be applied to the general funds to cover the indebtedness.

Creditors have received extension agreement forms to fill out and mail to the offices of the association without delay and the plan will become operative if 90 per cent. of the claimants come forward. The agreement reads as follows:

"Representations having been made to the undersigned as creditor of the Milwaukee Automobile Dealers' Association that said Association, as the result of the automobile races recently held by them in Milwaukee, have liabilities far in excess of their ability to pay; and,

Whereas, if a pro rata settlement to all creditors of said Association were made at the present time the same would result in an exceedingly small dividend to creditors; and,

Whereas, representation has been made to the undersigned creditor that said Milwaukee Automobile Dealers' Association have plans in mind, which, if carried out during the next few months, are likely to result in profit to said Association, which, together with other funds which they may be able to raise, will enable said Association to make a substantial, if not a full, payment of their obligations at a subsequent date:

Now, therefore, the undersigned, in consideration of the mutual promises hereby made, do hereby extend the time of payment of the amount due from said Milwaukee Automobile Dealers' Association to the undersigned respectively to the amounts set opposite their several names until March 1, 1913, and hereby agree to take no action or legal steps or proceedings of any kind whatsoever against said Milwaukee Automobile Dealers' Association, or any of its debtors, upon said account until after March 1, 1913.

This extension shall be valid and binding upon the undersigned only upon condition that ninety (90) per cent. in amount of the present indebtedness of the Association is so extended.

Mercedes Patents Not In Issue

The campaign recently instituted by the Daimler Manufacturing Company to protect its licensees under the Daimler patent rights has been confined so far to owners of Mercedes cars which have been purchased without recourse to the American licensees. So far no aggressive action has been taken to assert the patents themselves against the rest of the trade. But that

such action is not impossible is suggested by the notices that have been sent out to automobile owners on behalf of the Daimler Manufacturing Company.

The patents are very broad and apparently cover a number of elements in common use in the industry. Thus far none of them has been finally adjudicated in the United States Courts, although the foreign courts have passed upon some of them.

According to the company, the present action is to affect only those owners of Mercedes cars who made their purchases from foreign agencies and imported the cars direct. These number only a few, compared with the large number in use in the United States.

The bankruptcy proceedings against the Daimler Import Company are still in the courts and a final adjudication may not take place until December.

Olympia to Set New Show Record

LONDON, Nov. 4 (*Special Cable*)—The Olympia Show will be the greatest motor trade exhibition the world has ever seen, according to the opinion generally expressed in automobile circles of Great Britain. Every available foot of space has been utilized in the vast hall and the value of the exhibits amounts to \$1,250,000. Many of the notable importing firms and corporations have been squeezed out by reason of the extraordinary demand for space from British manufacturers. There are 353 exhibitors duly installed. This constitutes an entirely new record.

In the car section there are 119 exhibitors; in the carriage section, thirty-five; in the component and accessory section, 150; tire and wheel, thirty-nine; press, eight, and associations, two.

Great Britain has 45 per cent. of the exhibits; France, 23 per cent.; Germany, 10; Italy, 7; Belgium, 6; the United States, 6; Switzerland, 3 and Holland 3 per cent.

The show will be opened formally on Friday night and all indications point to the establishment of a new set of show records.

Hoosier S. A. E. Elects Officers

INDIANAPOLIS, IND., Nov. 4—At the first of the winter meetings of the Indiana branch of the Society of Automobile Engineers, held in Indianapolis on the evening of October 31, officers for the ensuing year were elected as follows: George A. Weidley, of the Premier Motor Manufacturing Co., chairman; Herman G. Deupree, of the Remy Electric Co., secretary, and Chester S. Ricker, of the Henderson Motor Car Co., treasurer.

The topic of the meeting was self-starters, the speakers being W. G. Wall, of the National Motor Vehicle Co.; W. E. Raiguel, of the Ignition Starter Co.; Chester S. Ricker, of the Henderson Motor Car Co.; Joseph Lamb, of the Ignition Starter Co.; E. V. Hartford, of the Hartford Suspension Co.; Charles Crawford, of the Cole Motor Car Co.; and Howard Marmon, of the Nordyke and Marmon Co.

Dodge Company To Handle Buffalo

BOSTON, MASS., Nov. 2—The Dodge Motor Vehicle Company has taken on the Buffalo electric as an exclusive line in the territory included in Norfolk, Suffolk, Essex, Plymouth, Middlesex and Worcester counties, the deal having been closed by H. W. Russell on behalf of the Buffalo company. The Dodge concern has handled gasoline cars at Cambridge and in Boston. The order provides for an allotment of 100 cars.

New Starter Company Incorporated

INDIANAPOLIS, IND., Nov. 4—With an authorized capitalization of \$150,000, the Ham-Meix Manufacturing Company has been organized and incorporated in Indianapolis to manufacture self-starters for gasoline motors. Those interested in the company are: Harry W. Hamilton, Benjamin F. Meixell, Harold Taylor and Samuel B. Sutphin.

18,000 See Brighton Beach Election Derby

Mason Racers of Milwaukee Fame Defeat a Dozen Veteran Performers—Racing Extends Until After Sunset

French Sealed Car, 3,000-Mile Run Planned for March—Christy Establishes Arizona Track Record

BEFORE a crowd estimated at nearly 18,000 a program of races was given at Brighton Beach on election day, the feature of which was the Election-Day Derby at 100 miles. This brought out a ponderous field of thirteen starters and stretched out so far that darkness fell during the last third of the distance, causing the finish to be drawn in the dark.

The Mason pair finished the full course and were awarded the two chief purses; Wishart's and Pullen's Mercers came next with ninety-eight and ninety-five laps respectively; Menker's Kline covered ninety-two laps and the Le Cain Stutz made ninety. Costello's G. J. G. was still running at the end but it was several laps behind the Stutz.

The race developed a number of mishaps and while nothing should detract from the honors won by the Masons, the Stutz, driven by Dave Lewis, was eliminated at a fortunate point for the winners. The same may be said for the National and two of the Mercer cars besides the ones that were placed.

The start was delayed about 30 minutes too long and the field was too large for the course, but fortunately no fatal accidents marked its running. At the end of the first 10 miles the National led with the Stutz pair close up. At 20 miles the Le Cain Stutz showed in front with Thebaud's G. J. G. second and the Ferguson Mercer third. At 30 miles the Lewis Stutz was out in front and running swiftly and steadily. His teammate was second and the G. J. G. third. The Le Cain Stutz blew a tire on the first turn and lost two laps, the G. J. G. and Mercer (Ferguson) moving up a peg. Whalen went over the embankment in mile 31, breaking the wheel of his National and putting it out of commission. Whalen and his mechanic were shaken up but not seriously hurt. The next striking happening was when the Lewis Stutz turned over at the head of the stretch, bending its front axle and eventually putting it out.

The last 30 miles were run in the growing darkness and the finish found the steady-going Masons at the head of the procession.

Besides the 100-mile race, a 10-mile event for cars with less than 300 cubic inches displacement was run, and was won by Lewis in his Stutz, against a field of eight contenders. A 10-mile free-for-all handicap was taken by Mitchell in a Mason, who defeated a field of nine contestants, while the 5-mile handicap for cars of less than 300 cubic inches piston displacement went to Ormsby in a Kline.

Throughout the race both the cars were prominent, but not in the first flight. They suffered little tire trouble and the Mitchell Mason was in front until near the end, when Mulford came along and wrested it from his teammate. The record was not disturbed owing to the caution necessary in the latter stages.

The policing was inadequate to handle such a large crowd. It is estimated that 1,200 automobiles were parked at the track.

Sealed Cars to Compete in France

PARIS, Oct. 12—With bonnets nailed down and all essential parts sealed, medium-powered French cars having a chassis price of not more than \$1,600 will take part in a 15-day 3,000 miles endurance test round France next March.

It is believed that the maintenance of all the seals intact for 15 consecutive days will not serve to prove the greater worth of the cars, while it will prevent the drivers giving those daily attentions necessary for any piece of mechanism, and which owners are quite willing to give at the beginning of a day's run. On this account the front and rear axles and the steering gear will be permanently sealed. The bonnet, the radiator filler cap, the underpan and the footboards giving access to the clutch and gearbox can have their seals broken for 10 minutes only every morning. At the expiration of this time the seals will be replaced and cannot be broken without the loss of points.

The arrangement will allow drivers to screw down grease cups, verify their motors, fill the tanks and make slight adjustments, but the time will not be long enough to make any repairs. The breakage of the radiator filler cap will entail a loss of 2 points; if the underpan of the footboard seals are removed, 3 points will be deducted for each; the lifting of the bonnet will cause a loss of 4 points. If the permanent seals are lost the car will be eliminated, and failure to maintain an average of 18 1-2 miles an hour on any of the stages will also entail disqualification.

With a \$1,600 limit the whole of the popular medium-powered cars will be admitted. The limit has been fixed on the chassis instead of the complete car because of the wide difference in body value on this type of European chassis. They vary, indeed, from two-seaters worth about \$150 to handsome inside-steering limousines listing at \$600 to \$1,000. In all cases the competing cars must be completely equipped touring models having not less than two seats with hood, windscreen, horn, running boards, lamps, headlights, etc. Numerous entries have already been received for the tour.

Christy Set New Arizona Record

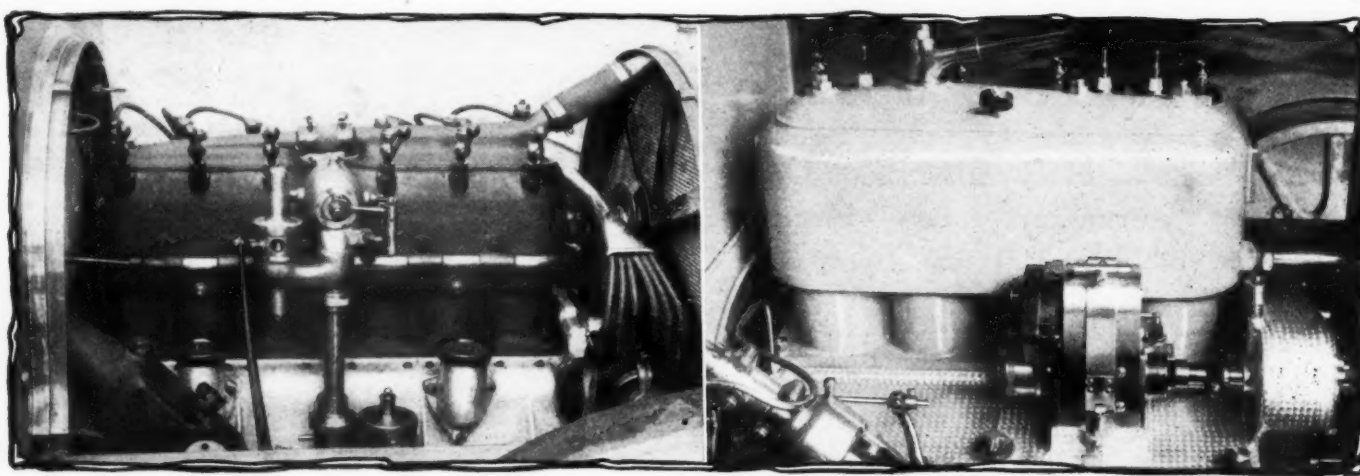
PHOENIX, ARIZ., Nov. 4—*Special Telegram*—Driving a Christy, rated at 120 horsepower, Barney Oldfield established a new mark for the mile on an Arizona circular mile track. The Christy finished the trial in 50 1-2 seconds, which is 1 3-10 seconds faster than Tetzlaff's time with the big Fiat last Thursday.

PHOENIX, ARIZ., Oct. 31—*Special Telegram*—Breaking the Arizona circular dirt track record for the mile, a Fiat 120-horsepower car driven by Tetzlaff set the new mark at 51 4-5 seconds. In the 50-mile feature event for cars over 300 cubic inches piston displacement, a Fiat driven by Tetzlaff won in 51:51 without difficulty of any kind. Another Fiat, Hill driver, was second in this event. Tire trouble delayed the Benz entry, driven by Meloane and the Cadillac handled by Soules. A broken steering knuckle caused the Cino, driven by Heinzmann, to plunge through the fence, smashing a wheel and shaking up the driver.

The Hill Fiat won the 15-mile handicap free-for-all in 15:57 while the National was first in the 15-mile event for cars that participated in the Los Angeles-Phoenix race having more than 230 cubic inches piston displacement. The time was 15:58 1-5. The Soules Cadillac won the 10-mile handicap in 10:44.

Boston Dealers Finish Race Meet

SALEM, N. H., Nov. 4—The uncompleted program of motor races which were originally scheduled for October 12 at Rockingham Park race track was run off here Tuesday, when the Boston automobile dealers who had cars entered conducted the events under their own auspices, no admission being charged. There were five events on the program. The first was the 1-mile time trials, in which Harry Grant won first and second places and Harry Cobe in a Jackson third. Their times were respectively: 57 3-5, 1:01 1-5 and 1:02 2-5. Harry Cobe in a Jackson won the 10-mile race with another Jackson driven by Charles Basle taking second. The 25-mile vent was captured by Jack Le Cain driving a Stutz, with Cobe in a Jackson second. The 20-mile match race between Grant in a Stutz and Le Cain in another Stutz was won by the former. The final event was a time trial for amateurs with George Downs in a National, the only entrant, his time being 1:05. The races were well attended.



Delaunay-Belleville motor for 1913 on the left and the Unic 1913 on the right with chain-driven timing gear

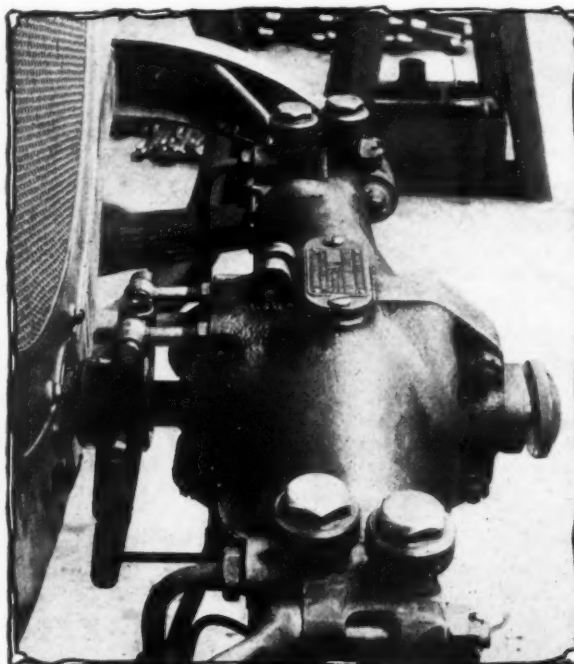
European Manufacturers Still Like Small Motor

Single-Cylinder Motors Abandoned and Small-Bore Fours Substituted in De Dion, Delage, Sizaire-Naudin and Peugeot Factories; Demand for Twin-Cylinder Motors Also Dropping Rapidly; Many Have Increased Stroke

EUROPEAN shows have not yet thrown open their doors, and as it is the practice of the English, French and German manufacturer to keep his new types back to the last possible moment, full data on next year's models are not yet available. Sufficient information has been secured, however, in the various French factories to indicate the general trend for the coming year. Following the example of the last two seasons, 1913 will be a year of detail but none the less real improvements, without any landslide toward non-poppet valve motors or the adoption of any of the wonderful hydraulic transmissions rumored in various quarters.

The 1913 season will see the abolition of the one lugger, and, to a very large degree, of the twin-cylinder model. Economic considerations have kept them well to the front, but after gradually falling off in public favor they have at last been dropped as unprofitable and replaced by small four-cylinder types. This statement should be supplemented by the explanation that the single and the twin may obtain a new lease of life in the very light, cheap class of car officially known in England as the cycle-car, and having more relation to the motorcycle than to the full-grown touring car. The Panhard company, which has never been accused of acting rashly, has abandoned its only twin-cylinder type and replaced it by a four-cylinder of 2.7 by 5.5 inches bore and stroke. It is the smallest four-cylinder ever produced at this factory. De Dion Bouton, a world-famed maker of singles, will build these for stationary purposes only, and although retaining the twin,

will add an 8-horsepower four, from which it can be inferred that the twin will be stifled out after another year. Gregoire has abandoned the twin for a new four; Delage has ceased making singles; Lorraine-Dietrich has practically abandoned the twin model. Renault is peculiar, for he has a big demand for twins to be used for taxicab purposes. Even he, however, has been obliged to produce a four-cylinder for the London market, and is supplying nothing but fours and a smaller number of sixes for touring purposes. Sizaire-Naudin, after making nothing but singles, now produces nothing but fours; Peugeot and Lion-Peugeot, another single-cylinder enthusiast, has dropped the one lugger, retained the twin, and put on the market a four-cylinder of only 2.1 inches bore.



Compressed air starter on the Delaunay-Belleville

French manufacturers stand firm for the small and medium motor. There is no tendency whatever towards bigger motors, although every effort is made to get increased power out of existing dimensions. Four-cylinder motors of more than 4 inches bore are in a very small minority. There are a few firms, notably Delaunay-Belleville, producing six-cylinder cars of 3.8 by 5.5 inches bore and stroke, but even these are largely outnumbered by the fours and sixes from the same factory of only 3.3 by 5.1 inches bore and stroke. To the French idea a motor of 3.5 inches bore, four cylinders, is big enough for any load; to the majority it is too big, and 3.1 is sufficient for any reasonable person.

There has been a general increase in piston stroke without any extremes. Such firms as Hispano-Suiza, Gregoire, Sizaire-Naudin,

Ballot, having ratios varying from 2.2 to 1 to 2 to 1, have not changed their position, but a large number have moved up from 1.3 to 1.5 or 1.6, and there is a notable convert in Panhard with its new small four-cylinder having a stroke-bore ratio of 2 to 1.

Silent chain drive for cam and magneto shafts, etc., has increased in popularity. There is not an example of any manufacturer who has tried chains going back to meshing pinions, but there are a number having formerly made use of pinions who now carry chains. In a few cases, where the chain has been refused, manufacturers have adopted a spring drive for the crankshaft pinion.

Probably 75 per cent. of French manufacturers now use forced-feed lubrication through a hollow crankshaft. The remaining 25 per cent. is largely made up of big manufacturers who, having developed various types of pump circulating systems refuse to drop them for the increasingly popular forced-feed type. Among the younger progressive firms, the firms specializing in small high-efficiency motors, forced feed is invariably adopted. Attention is being paid to detail refinements of the forced-feed system. Attempts are being made to automatically maintain a constant level in the sump or crankcase reservoir; to cool the oil by ribs on the base chamber, or otherwise, to adopt a greater number of filters and make them easily dismountable; to give facilities for regulating the oil pressure at will; all oil leads are being made internal, and in a large number of cases are steel tubes cast in the crankchamber.

There will be no change in the situation regarding clutches. Where three speeds have existed manufacturers are now providing a fourth. It is a claim on the part of the public which has to be met, and is often met reluctantly. The worm gear has made slight progress. Those manufacturers who have taken it up have probably done so more to meet the requirements of the English market than that of their own country, for it must be admitted that the French motorist is generally satisfied with bevel gearing. The De Dion Bouton has adopted worm drive for three chassis—two eight-cylinder type and one four-cylinder. Gregoire is using it on all their chassis fitted with the Knight motor and also on a new small four-cylinder car; Bayard-Clement has a worm drive for a Knight-engined car; Darracq built a small number of cars with worm drive, but is not pushing the idea. The majority will adhere to the bevel.

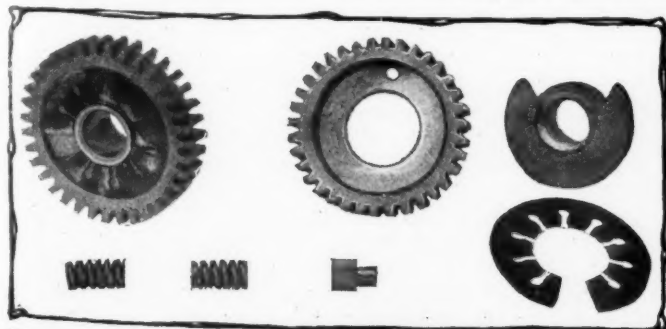
There have not been the practical developments that were expected in the non-poppet valve field. Panhard will use Knight motors for at least three-quarters of its 1913 output; Gregoire will produce about 250 cars with the Coventry-built Knight motor; Mors will build rather more; Bayard-Clement will produce probably 200 or 300 chassis with Knight motors. After having bought the patents for the Reno-Bois valveless motor Unic has decided to do nothing, at any rate for the 1913 season. C. L. C., at present building a single-cylinder rotary-sleeve motor, will have a four-cylinder on the same principle at the Paris show. Buchet will bring out the Dubois-Rousseau reciprocating ring type; Vinot-Deguingand has abandoned the same. Delahaye has a valveless motor in preparation, but it is very doubtful if it will be ready for the Paris salon. Rolland-Pilain will build a small number of its single-sleeve type, but still more

poppet-valve types. Schneider, after a lot of experimenting with a valveless motor, appears inclined to confine his efforts to one semi-racing model, all the others having poppet valves. C. I. D. will make rotary-ring types exclusively, but the total output of the factory is not very high. Darracq will have two small rotary-valve motors and one big poppet-valve type. There may be others in the experimental stage, and it may be found, when the show opens, that I have overlooked some notable exception.

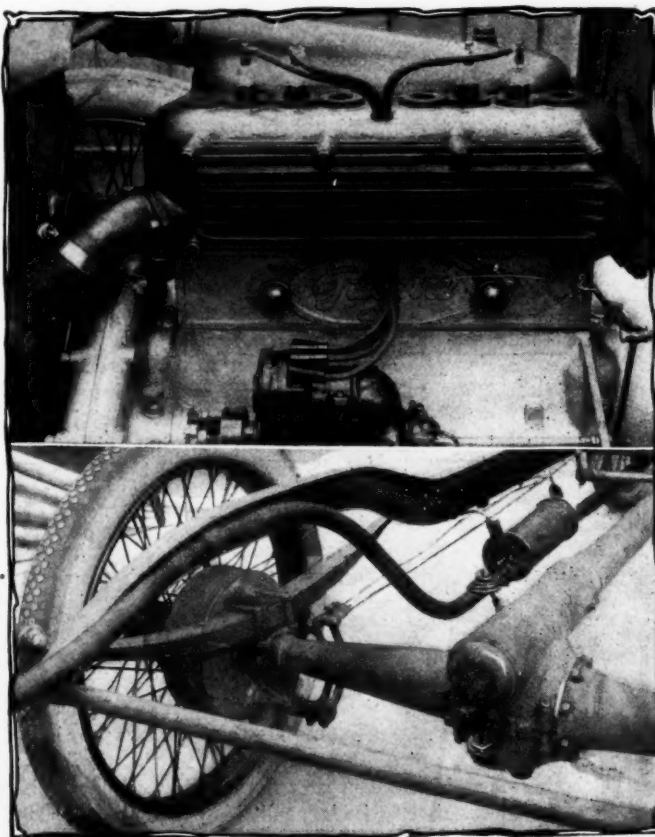
In the transmission there is a tendency towards the abolition of torque and radius rods, all the propulsive effort being transmitted through the rear springs. In the matter of springing the tendency is towards three-quarter elliptics, but this is doubtless more a concession to fashion than because of any inherent superiority in this type. Whatever the type, springs are being made broader and longer with a view to easy riding qualities.

In France no great enthusiasm has been shown for either the self-starter or electric lighting. Delaunay-Belleville appears to be the only firm making use of a self-starter, and this is not a standard feature, but is fitted as an extra. It is of the compressed-air type mounted across the frame just at the base of the radiator and connected up to the front end of the crankshaft by means of a coupling operated from the dash. The electric lighting situation is different, for a very large number of owners have a dynamo and lighting equipment installed when the body is fitted, but no manufacturer appears to have thought it necessary to include such a fitment as an integral part of the chassis.

Wire wheels are growing in favor, a number of firms making them a standard equipment and others, while prevented from doing so by reason of the extra cost, making the fixed hubs to be interchangeable with those of the type of wire wheel in which they are interested. Thus, if wire wheels are preferred, the owner has only to pay the extra cost of the wire type compared with the artillery pattern, and is put to no additional expense for the changing of the hubs. In addition to Rudge-Whitworth and Riley, who were the first to get on the French market, there are several makes of wire wheel manufactured in France and a few makers who supply detachable artillery wheels.



Details of spring drive pinion on end of crankshaft in Chapins and Dormer motor



Four-cylinder Gregoire motor and the double brakes mounted on rear wheels

Digest of the Leading Foreign Journals

Question of Wear and Durability of Long Stroke Motors Argued by the Hypothetic Method—New Near-Quartz Glass Figures in Lamp Improvement—Popular Views on Waste of Fuel—Heavy or Light Omnibuses—Late Type of Fire Engines

ON WEAR of Long Stroke Motors—In order to compare the mechanical efficiency of long and short stroke motors, with which question that of wear and durability is intimately connected, Mr. Faroux, the well-known authority in France, analyzes the conditions arising in two motors supposed to be of equal power, equal bore, equal cylinder volume and equal mean effective piston pressures. This supposition eliminates divergencies whose effect it would be difficult to estimate convincingly. Now, if one of these motors has a short stroke, say 90 millimeters, and the other a long one, say 180 millimeters, the supposed data have to be mutually reconciled by a difference in the number of revolutions. As the mean pressures are the same in both motors, the power is determined by the equation

$$W = KpSv$$

in which K is the coefficient of mechanical efficiency, p the mean pressure, S the piston area and v the linear piston speed per second, the latter equalling double the stroke l multiplied by the number of revolutions per minute, n , divided by 60; or $v = ln \div 30$.

If the mechanical efficiency of the two motors were equal, their piston speeds would have to be equal, and for purposes of comparison it is therefore fair to assume provisionally that the short stroke motor, in accordance with the formula, must make twice as many revolutions per minute as the long stroke motor; and then to consider what happens.

In the first place, whatever the length of the stroke, the crankpin never makes more than one revolution in the bushing of the connecting-rod knuckle for each turn of the crankshaft. And, as piston pressures are equal, the two crankpins will be of practically the same diameter and the distance traveled by a point on their circumference will be the same for each turn. The work spent in friction in the connecting-rod bearings will thus be twice as great in the square motor as in the long one.

As the piston changes direction twice as often in the square motor as in the long one, the destructive effects of inertia will be greater in the former. To be sure, the latter will have a longer and therefore a heavier connecting-rod, but this cannot offset the disastrous effect of doubled rotary speed. Under the combined action of doubled friction in the crankpin bearings and twice as many arrests and accelerations of the reciprocating parts, the square motor will begin to knock earlier than the long one. And once play in the bearings has been started, the effects of interrupted inertia will aggravate themselves progressively.

The valve action gives rise to another loss of power. The valves of the square motor in order to function, for example, 2,400 times per minute must be equipped with much stronger springs than required for the long motor, where the valves serve only 1,200 times per minute. The gas tension remaining in the cylinder at the end of the power stroke is practically the same in both cases. Hence a greater power is needed for raising the valves of the short cylinder, and this power must be applied twice as often.

As between two motors of equal power and equal bore, the

mechanical efficiency will thus be inferior in the short motor; it will wear more rapidly and will be less silent. A second example may be offered. Two motors of the same cylinder volume, the same average piston pressure and turning at the same angular speed may be compared. The first one may have a bore and stroke of 98 by 98, for example, and the second one 78 bore by 156 stroke, which will give both a cylinder volume of 3 liters. The piston area of the first one will be 75.43 square centimeters and that of the second 47.784, which figures are in the proportion, approximately, of 1.6 to 1.

Now, if the crankpins in the two motors were of the same diameter, the short motor would spend in friction in the crankpin bearings 1.6 times more work than the long one. But as the short motor has the larger piston area, the bearings of its crankshaft must be of larger diameter to resist the impulsion of the explosions. Assuming a pressure from the explosion of 30 kilograms per square centimeter, one crankshaft must sustain 2,250 kilograms and the other 1,410. The larger diameter of the pin will make the circumferential speed proportionately greater in the short motor, and consequently the friction in its bushings will be greater, as well as the wear resulting from it. The short motor will, then, also in this case reach the knocking stage earlier than the long one. [However, the wear is also distributed over a larger surface.—Ed.]

The forces of inertia are also to the disadvantage of the short motor. Its connecting-rod has to transmit a force which is 1.6 times higher and it must have a larger section. This is offset in part by the greater length of the connecting-rod of the long motor, but the end which follows the reciprocating motion of the piston must be heavier in the short motor and the piston itself likewise, since it is larger and transmits the same power by a slower movement. Finally, in order to guide the larger piston as perfectly as the smaller one is guided its length should be in proportion to its diameter.

The reciprocating masses are thus seen to be larger in the short motor and consequently the forces of inertia are more destructive. [However, their linear speed is much smaller, which is after all the element which counts for most.—Ed.]

In the matter of the piston and cylinder friction the short motor suffers by comparison, too. If the connecting-rods work with the same angularity, the amount of friction is essentially equal in the two cylinders, but it is distributed over a longer cylinder wall in the long stroke cylinder, and there is therefore smaller tendency to ovalization. [However, the area of the cylinder wall in the long stroke cylinder being smaller, under the supposition of equal cylinder volumes, and the degree of concavity greater, this point does not seem conclusively settled.—Ed.]

Reverting to the comparison of motors with equal bore, piston speed and mean effective pressure, the amount of friction for each stroke is also here the same, but the number of strokes in the short motor is twice as high as in the long one and the wear and ovalization of the cylinder therefore more rapid.

At both extremes of design the short motor is thus found to

be inferior to the long stroke motor of the same power in mechanical efficiency and resistance to wear.—From *La Vie Automobile*, October 19.

MANY Ways of Wasting Gasoline—It stands to reason that waste of fuel may be due to faults in the gas mixture, faults in the use of the gas mixture, faults in the motor, faults in the use of the motor, faults in the vehicle and faults in the use of the vehicle; and this list of possible causes may be further subdivided. If the gas mixture is too rich the waste is self-evident; if it is too poor and does not give power enough for the work on hand the practical consequence is that the throttle is opened or that the gear is lowered, so that either larger charges are used or more of them, in both cases with the result that more gasoline is used than would be the case if the mixture were at its best for the work on hand. At this point the fault may lie in the carbureter or in choosing the wrong gear for the desired vehicle speed; it may also lie in wrong gear proportions making it impossible to choose a degree of throttling and a gear which work together for fuel economy at a desired vehicle speed. In the use of the gas mixture the question of ignition is uppermost, it being always understood that when the best possibility for power development is missed then gasoline is wasted. Weak ignition, resulting in a slow explosion, and late ignition both result in hot exhaust in which the heat units of the fuel are dissipated. Lack of efficiency due to indifferent motor design is by far the most important cause of fuel waste. The best motors of this day show by tests that not more than one-half the amount of fuel is used in them for a given power, as compared with the amount used in motors of antiquated design or the motors which were the best found in any automobile constructed 6 or 7 or even 4 years ago.

Under faults in the use of the motor, as distinguished from faults in choosing the gear with which the motor is to work, the most important is the employment of a motor which is too large for the kind of work asked of it. However, nearly all automobile motors are too powerful for their average work, so as to be powerful enough for emergencies and fancy performances, and the highest possible fuel efficiency can therefore not be expected of them. Similarly the four-cylinder motor and, in still higher degree, the six-cylinder motor use more gasoline for a driven amount of work than a good single-cylinder motor, the thermic and the mechanical losses being all greater than in the simpler machine with a suitable flywheel, yet no one wants to return to the older type. Fuel efficiency is not an absolute requirement when conflicting with style and convenience.

The fuel waste which is of greatest interest to the motor car owner is that which is due to causes which it comes within his province and competence to remove or obviate.

Many of these relate to his own manner of using his vehicle, and some of these may be enumerated. In ordinary pleasure cars the valves are not large and the average carbureter is made or adjusted to feed its mixture in a manner conforming with this fact. These relatively small valves act as brakes on the motor power, by strangling the flow of gases, long before the highest

motor speed is reached. Now, if the driver wants to speed up and opens his throttle accordingly, he frequently opens it more than necessary for getting the speed he wants and thereby sets the motor to work partly against itself. This source of waste occurs practically only with motors of old design and small power or motors equipped with a governor not properly co-ordinated with the throttle.

In using the brake for stopping the vehicle on every occasion when the throttle might better be resorted to for slowing up gradually a considerable waste of fuel is incurred in the aggregate, some of the wasted fuel slopping over from the fuel jet.

Poor compression in the motor is a prolific source of waste by reducing the power obtained at a given position of the throttle. Many motors are tight when cold but leak compression when hot, a condition most frequently due to poor lubricating oil. It may be recognized most readily by observing the breather tube. If visible grayish gas is discharged from it a piston leak may be inferred, even though none is noticed in cranking the motor. Valve leaks and all other leaks in the economy of the motor are in the same class of causes.

Clutches which slip a little all the time, without it being noticed as a rule, and neglected lubrication throughout the mechanical working parts of the vehicle are often forgotten as possible causes of fuel waste when a car owner notices that his gasoline bills are running higher than they used to or higher than those of his neighbor who perhaps has a similar car and a similar carbureter.—From *Automobil-Welt*, October 11 and 18.

Reflector System for Lamps—A new German construction is shown in Fig. 1. It is one of the industrial upshots of that practical manufacture of near-quartz glass which is already assuming considerable proportions, in so far as a similar design with ordinary glass in the small auxiliary reflector scarcely would be practicable owing to the proximity of the flame. The heat in conjunction with unavoidable irregular cooling from air currents would color and crack it, while the near-quartz, as it might appropriately be called, shares with pure quartz its indifference to heat and heat-changes in a large measure. Its expansion and contraction are almost nil, and it has been claimed that its mechanical strength has been made equal to that of glass lately. The same material is used for the one-piece face crystal of the lamp. The two reflectors are backed with silver. With a diameter of 25 centimeters (10 inches), not counting the rim portion covered under the metal flange, the large reflector which is always behind the flame has a focus of only 9 centimeters, and will thus send out a compact bundle of light rays when the flame is placed within this distance, while the percentage of light received directly from the flame is increased in proportion to its nearness. The small reflector intercepts only the least valuable of the reflected rays, viz., those striking the main reflector at nearly right angles, and, on the other hand, adds much to the total volume of light emitted by throwing an inverted image of the other side of the flame back into the main reflector, which thus practically receives light from two flames. If it is now desired to remove the strong glare, out of consideration for traffic coming in the opposite direction, or if it is wanted to send light out at a wide angle so as to illuminate a sharp curve, the small reflector is turned right about by means of a Bowden wire connection to the driver's seat and takes the position as shown at the right side in Fig. 1 and in dotted lines in the central drawing of the same, in which it cuts off all rays from the flame to the large reflector. The light now comes from the small reflector only and the rays from it are highly divergent, as indicated by the drawing, while throwing a strong light over a wide scope of the ground immediately in front of

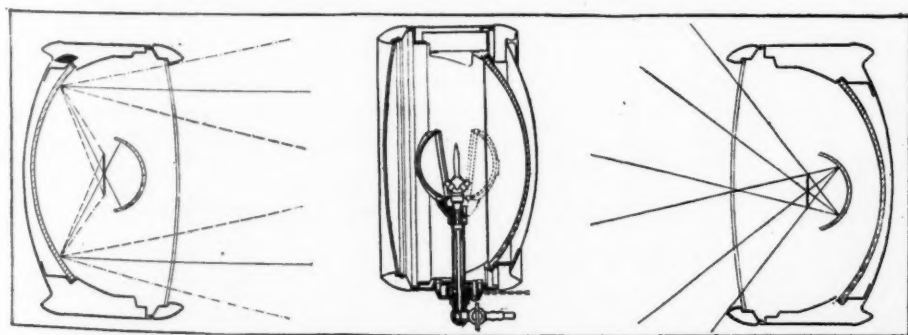


Fig. 1.—German searchlight acetylene lamp with reversible auxiliary reflector to kill glare and light turns of road

the vehicle. The central crossing of rays kills the glare straight ahead. Different effects may be obtained by having the axes of the two lamps which are ordinarily carried on a vehicle either slightly divergent or parallel or slightly converging, the latter arrangement giving a very strong illumination of the middle of the road by overlapping of rays. This reflector system is intended for use with an acetylene light source and gives the best results with dissolved acetylene and a two-jet burner. When an acetylene gas generator is used, the gas pressure is liable to vary considerably—with the small care ordinarily given to generators by the average driver—and this variation affects the quality and volume of the reflected light detrimentally. For use with a generator a single-jet burner is found most suitable. The gas consumption for a lamp of 10-inch diameter is about 25 liters per hour.—From *Zeitschrift d. M. M. Vereins*, Sept. 30.

HEAVY or Light Motor Buses—As very few motor buses for public traffic have been built in the United States while they have been in general use in France and England since 1907, it appears likely that the type of construction which has been developed in one of these countries will be taken as a model whenever a project for the establishment of motor bus lines shall have reached the point of actually impending realization in America, and it becomes interesting to note that the heavy type of omnibus used in Paris, for example, is not looked upon with undivided approval, but that on the contrary several important shortcomings are charged against it, although nothing better to take its place has so far been developed in practice.

Mr. Contet presents in *La Technique Automobile* the characteristics of this type which is used in two varieties, one the Schneider-Brillié and the other designed and made at the Dion-Bouton works. The motors are placed under the driver's seat to reduce the wheel base. They have four cylinders in three different dimensions: 125 by 140, with a maximum speed of 900 revolutions, 115 by 140 turning at 1,050 revolutions and 120 by 130 (the Dion vehicle), the latter also of what is now termed slow motor speed like the others. The compression was originally 4.75 kilograms per square centimeter, but this was reduced to 3.6 kilograms. The cooling is by thermo system and Solex centrifugal air-pump radiator which gives complete satisfaction. The drive is by shaft to the differential and from the differential shafts by small pinions to spurwheels secured upon the driving wheels. The driving thrust was at first transmitted by rigid rods of pressed steel, but these vibrated enormously and now the thrust goes through the main leaves of the rear springs alone, with perfectly satisfactory results. The fuel first used in 1906 and 1907 was carburetted alcohol, which proved too expensive. Subsequently benzol was adopted and the consumption of this fuel has been gradually reduced to 50 liters per 100 kilometers. The vehicle seats from 28 to 34 passengers.

The defects of this type have largely to do with its weight. The chassis for the 34-passenger vehicle weighs 4,400 kilograms, the body 1,600 kilograms, making a total for the empty vehicle of 6 tons and with passengers considerably more than 8 tons. The double-deckers were still heavier. As a result of this weight

the macadamized streets where the buses pass with some frequency are rapidly deteriorated, and the inhabitants of apartment houses on the stone-paved streets complain of the trembling and shaking of the houses caused by this traffic. In several instances damages have been legally collected from the omnibus company on this account.

To ease the steering of the vehicles it has been necessary to use a very low steering gear ratio, rendering necessary a large movement of the steering wheel and resulting in veritable gymnastics by the drivers, to which new drivers have to become accustomed before a vehicle can be entrusted to them. As the streets where the buses mostly travel are naturally—in other cities than Paris—the narrow ones where street car tracks are objectionable, the presence of vehicles measuring 7.5 meters in length and 2 to 2.3 meters in width is fraught with many inconveniences.

With a view to remedying these defects it may be considered, says Mr. Contet, if the development which has taken place in motor construction since the time when the heavy type of bus was first placed in commission does not now justify a radical departure from the principles which were then laid down and which have dominated this branch of automobile construction ever since.

The progress made involves, for example, that motors of high speed and high compression and generally of a power and fuel efficiency far superior to that of the motors still used in the buses can now be made quite as durable as the older type. Especially with benzol as the fuel, the high compression of modern motors would lead to much smaller consumption than 50 liters for 100 kilometers, the combustion would be more perfect and considerable money now spent for removing carbon deposits in the bus motors—a feature which has been blamed upon the benzol—would be avoided.

By using a high-speed motor it will be possible to reduce considerably the weight of all the mechanical organs which share in this high speed. Altogether a lighter type of vehicle seems to suggest itself as practicable the moment it is assumed, in accordance with facts which have by this time been abundantly verified, that a motor of the modern light design will resist the wear and tear of the traffic. A vehicle with 20 to 25 seats should probably be the largest size. It should not weigh more than 5,000 kilograms fully loaded. Such a vehicle, in order to scale an incline of 8 degrees at 8 kilometers per hour would require power equal to 14 horsepowers and, figuring with a loss of 50 per cent. in the transmission, it would be safe to specify a motor of 30 horsepowers, which may now be built with cylinders of 85 millimeters (3.4 inches) bore and 40 millimeters (5.6 inches) stroke with a compression of 6 kilograms and a maximum speed reduced by a governor to 1,500 revolutions. Such a motor would not have to work hard except on the inclines, and could be operated with three gear speeds.—From *Technique Automobile*, October 15.

FIRE Engine Features—Among the numerous fire engines with centrifugal pumps which are turned out at German automobile factories one made at the Benz-Gaggenau works recently attracted attention at a local exhibition in Dusseldorf and at competitive trials arranged for a convention of fire departments in Rhenish Prussia and Westphalia. The four-cylinder motor gives 52 horsepowers at 800 revolutions per minute, 63 at 1,000 revolutions and 75 at 1,200 and drives a centrifugal pump with four disks made by Ehrhardt & Sehmer. Geared to 1,700 revolutions per minute this pump discharges 2,000 liters (528 gallons) at a manometer pressure of 100 meters, which is taken to indicate that the pump will deliver this quantity at a height of 100 meters if the water is led to this altitude within the hose. At the trials the height of the throw from nozzles of 25 millimeters (1 inch) diameter was 40 to 45 meters with a manometer pressure of 11 atmospheres (110 meters), and with nozzles of 30 millimeters diameter a height of 50 meters was reached by a pressure of 13 atmospheres.—From *Allgemeine Automobil-Zeitung*, September 27.

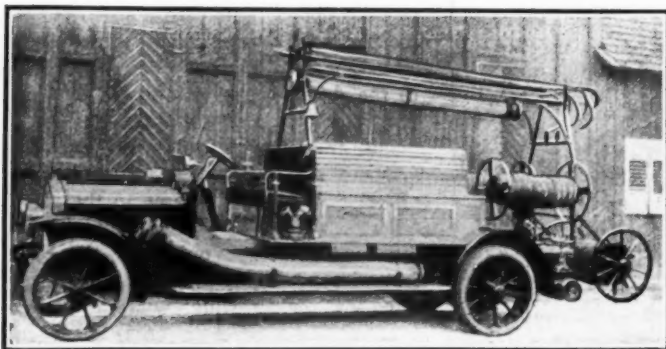


Fig. 2.—New German fire engine with quadruple centrifugal pump

Recording Cost of Trucks

Why Exact Records Are Required To Utilize Few Trucks on an Efficient Basis

One or Two Simple Forms Help in the Establishment of Standards of Maintenance Cost

WHILE systematic recording of the work done by motor trucks has shown that these vehicles if utilized to their full capacity are always more economical than if the same work were done by horses, the statement is frequently heard from the users of single commercial vehicles that these do not pay. By this latter profound expression the owner means to say that the expense of his motor deliveries is too high in proportion to the work accomplished. It has been shown over and over again, however, that if such cases exist the fault is not with the automobile but with the people handling it. Cost of upkeep is a most elastic figure, and seems to be influenced by these factors:

- (a) Direct expense for fuel, oil, tires and repair parts;
- (b) Wages of driver, helper and mechanic, where the labor of a skilled man has to be called upon to keep the car tuned up;
- (c) Work accomplished, that is weight carried for a number of miles in a number of hours, as compensation for the expenditures incurred.

If the user of a single freight automobile who claims that it does not do more efficient and economical service than horse teams consuming the same amount of money will keep a detailed record of the cost and work of his vehicle, he will in every case be able to locate a cause for the high-priced maintenance of the vehicle, a cause which may be eliminated. It may be that the truck is not running one-third of the time while out on deliveries, which of course greatly reduces its value, or increases its operating cost; or perhaps the driver does not treat the truck as it should be treated, so that waste of fuel, frequent replacement of tires and necessity of repairs of the mechanism result. By keeping a record of the work done by the truck every day and the fuel consumed thereby, two principal factors of upkeep are determined, and by further records repairs, tires and lubricants used may be kept track of. As soon as a sufficient number of records are at hand, the owner should approach the dealer who furnished him with the car, show him his records and invite suggestions as to reduction of upkeep expense. In the majority of cases the dealer, when confronted with the records of 2 or 3 months' operation, will be able to propose a solution of the user's problem within a few minutes or will come to his assistance in some other way, so that finally the standard of expenditure is reduced. This is part of the service the dealer owes to his customers.

A form which is proposed to be used by the user of one or two trucks is shown in Fig. 1. In practice the form, which is to be printed on thin cardboard, may be made as deep as necessary to permit of recording all the deliveries made by a truck in a day. The form is started when the truck leaves the garage or store in the morning, the time of starting being entered together with the number of the trip, in this case, one. Under details the names of the companies or individuals called on by the truck are recorded, and in this way the record may simultaneously be used as a general receipt, if the owner desires to use a blank somewhat wider and accommodating a column for the receiver's signature. When the truck returns to the store, the time of its arrival is marked on the form, and the second trip with its starting time are also recorded, and so on, until the working day is over. The important records of the gasoline consumed by the truck during the day, of the mileage traveled

and the running time, giving the hours and minutes the truck was actually moving on the road, are entered on the upper portion of the form and serve as the most valuable part of the records. Under remarks, extraordinary delays, mishaps, etc., find their place. By printing the reverse side of the form with the four columns, like the face side, the space of the blank may be considerably increased, and a greater amount of actual work may be recorded on a blank without enlarging its size.

A similar blank which is not shown here and which serves for summing up all the records made in a month will help the owner to gain a concrete idea of how his truck costs were composed in that space of time. This sheet has spaces for recording the total amounts of gasoline, cylinder oil, transmission and differential grease, tires, and spare parts used, with a possibility of giving a detailed record of the latter item. Furthermore the total number of miles run during the month and the total number of running hours are noted on this sheet, as well as the following facts which are readily calculated from the records: average speed, consumption of fuel and lubricant per mile, total cost of upkeep per mile, and, if possible, fuel and tire cost per ton-mile.

In some cases the dealer may not be able to inform the user of what standards of expenditure may be expected in the maintenance of a truck, and in this case the best thing to do is to address the factory, or nearest selling branch of the manufacturer. It happens very frequently that the owner considers his case absolutely singular and original, and therefore may be inclined to believe that he cannot expect good advice from outsiders. But it is a fact that the cases of trucks which do not pay may be classed under a few types, according to the variables which enter into the cost of truck upkeep, and which are enumerated above. Upon addressing competent experts in truck operation ninety-nine out of 100 owners find that their case is typical and easily to solve.

Daily Car Report			
Driver		Date	
Car No.		191 ..	
Gasoline Used			
Mileage Made			
Time Run			
Remarks			
Sign Here			
TRIP	START	DETAILS	RETURN

Fig. 1—Blank which is proposed for keeping track of the operating cost for a single-truck owner

Foreign Constructions Designs and Practices

Working Conditions Should Be Brought Into Consideration in Testing Steels for Constructional Purposes

High Temperature, Heavy Load and Shock to Be Sustained
Often Overlooked by Engineers in Selecting Material

STEEL for automatic construction is not, as a rule, tested under the identical conditions of the use to which it is to be put in subsequent practice.

Testing plants are needed where the test conditions will closely approximate practical running conditions of the car. But these tests have always been difficult to make. Some of the methods take too much time that it is often preferable and productive of more good to proceed by rule-of-thumb and after acquiring the necessary experience follow the beaten path.

If the general importance of testing materials under conditions akin to practical use is sufficiently appreciated, it will suffice here to review some of the processes which appear to be good in view of the facts and the general need. If steel is to be subjected to temperature changes during service, that the steel should be tested under identical conditions of temperature change is advocated.

The necessity for adequate testing of materials covers a wide range of activity, especially as engineering work is so close to the unknown that it must be regarded as uncertain. Take, for illustration, a fine specimen of a boiler plate; it is tested cold, at the temperature of the surrounding air, but it is subjected, not only to high temperatures, but a too wide temperature variation in practice. What, but uncertainty, attends the life of the boiler? It is not in temperature change alone that uncertainty rests. It is said that good steel for a bridge structure must have its sulphur and phosphorus constituents down to 0.04 per cent. If the steel is to be used as framework for a building, however, these constituents may be even above 0.06 per cent. In this allowable variation between bridges and buildings, so far as sulphur and phosphorus in steel are concerned due notice is taken of the effects of these constituents on steel, but when it comes to automobiles do we continue to differentiate? No! Why not? It requires absolutely no argument to show that steel is subjected to a far greater difference in shock as between automobile and bridge use than between bridge and building use.

In building work while the load is considered live it is not the same serious live load as the members of a bridge must labor under. In consequence, a lower factor of safety, as it is called, is used in the building structure than in the bridge. It is also the practice to use poorer steel in the building than in the bridge. In a word, while the general physical properties of the two steels may be quite the same, the sulphur and phosphorus contents will differ as stated.

Do engineers make due allowance for the effects of additional shock? No! On the contrary they reduce the factor

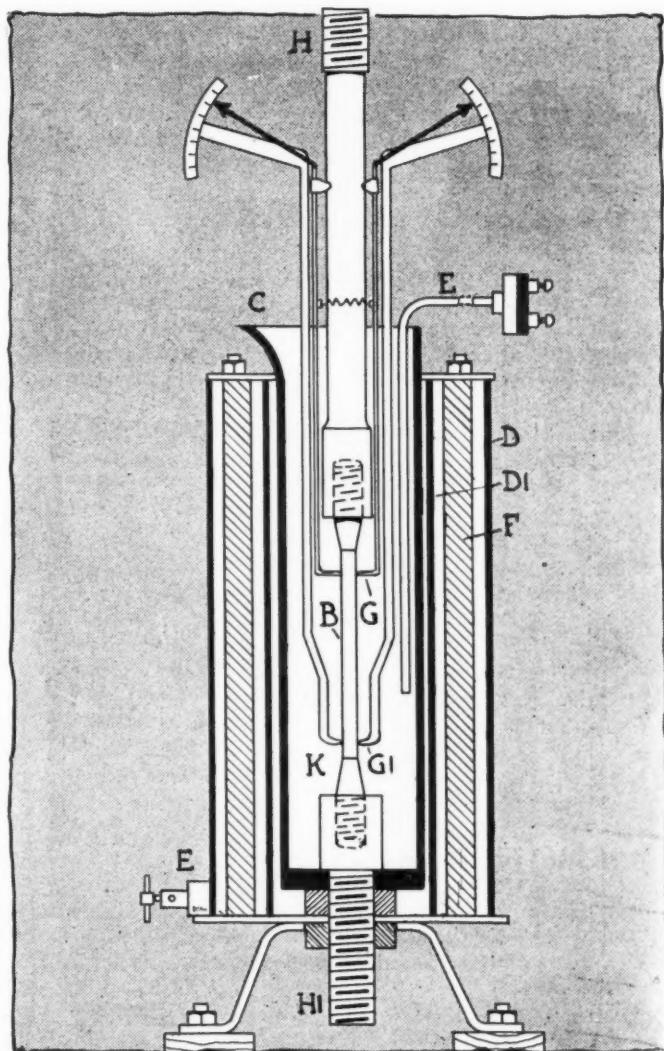


Fig. 1—Section of Steel Testing Machine in the Krupp laboratory at Essen, Germany, employed to test steels at high temperatures.

The parts designated are: B, vertical specimen bar to be tested; H, top holder for specimen, and HI, bottom holder for same; G and GI, top and bottom gauges for test specimen; C, crucible for test, and K, salts used in crucible to generate necessary heat; D, is outer shell; DI, inner shell; F, spacer between shells; and E, necessary electrodes.

of safety and demand no better steel than that which is used in bridge construction work so far as sulphur and phosphorus are concerned.

Fig. 1, a section of a testing machine used in the Krupp plant at Esseeu-Ruhr, Germany, for testing steel at high temperatures, proves that steel makers of the first class fully appreciate the need of just such tests. In this example the specimen of the steel to be tested is adjusted to the holders in the usual way, excepting that a special form of crucible filled with barium or other salts is provided, and an instrument of precision is fitted to the whole in order to observe

the elastic limit of the steel when the temperature is raised to the desired point.

The temperature is raised due to the melting of the barium or other salts in the crucible, an electric current being used, with electrodes fitted in the crucible for the purpose. In order to keep the molten salts in the crucible, it not only stands vertically, but the bottom holder, which must pass through the bottom of the crucible, is provided with a suitable packing for the joint. The crucible and its fittings, adjusted and related as indicated, go into a testing machine for the pull to be exerted, but this pull is only sufficient to determine the elastic limit of the steel at the desired temperature. Boiler plates, for instance, are tested at a dull red heat. Other materials are tested at the temperatures at which they are required to do practical service.

Referring now to shock tests, remembering that it is of no great value to know the conventional physical properties of automobile steel if the shock resistance qualities are not known, it will suffice for the purpose here to show one method which is quick, accurate, and capable of being worked by the regular force of men in any ordinary plant.

The shock test sanctioned and advocated by the German Union for the testing of materials is the one referred to here. The test bar is of rectangular section, 30 by 30 millimeters, with a distance of 120 millimeters between supports. The test bar is notched to the center, Fig. 2.

The Charpy pendulum testing apparatus is used to make the shock test using the test bar of the size mentioned and advocated by the German Union. The head H, Fig. 2, on the free end of the pendulum strikes its blow against the test bar B, fair in the plane of the notch N, with sufficient force to rupture the test bar. It remains merely to note the force in kilogram-meters or foot-pounds required to rupture the test bar. This information is given direct by means of a registering device fitted to the Charby pendulum apparatus.

That there is a great and serious variation in the shock ability of different steels is quickly told by the use of this apparatus. That the conventional physical properties, as they are usually given, is a fair index of the quality of a given steel for a purpose is far from the truth. But this should not be wondered at. It is well understood that both good and bad steel may come from the same chemical composition. It is also understood that good and bad steel may come from the same heat, and it is even possible to get good and bad steel from different sections of the same bar.

The great point, under the circumstances, is to know as much about the steel to be used as possible. It is sound to say that nothing of great value is known unless the shock test is made as well as tests for conventional physical properties as tensile strength, elastic limit, elongation and contraction of area of the test bar. But if there is to be a display of ignorance about steel used in automobile construction, if the user is to accept the steel maker's grading of the fabric, the shock test as here referred to should not be disregarded. A bad piece of steel can never get by in the shock test—its presence will be proclaimed. A good piece of steel will always be known by its shock-resisting qualities.

Then, too, if steel must be heat-treated, the dangers are great when poor steel is used, and these dangers are too great to be ignored even when good steel is used. But the shock test will find trouble if the heat-treatment given a grade of steel is inadequate for the need, and, since these shock tests may be quickly made, it is easy enough to conduct a few experiments for the purpose of determining the best heat treatment for a given grade of steel.

In order to show just about the reasonable expectation from the use of steel for automobile purposes taking the Charby shock test as the index of quality, a few tests of Krupp steel are here given, Table A.

In the steels mentioned the shock-resisting qualities vary between 361 foot-pounds per square inch and 1,987 foot-

pounds. This wide range of shock values by the Charby test shows in the face of the fact that, in these steels the sulphur and phosphorus constituents range as low as 0.013 and keep below 0.028 per cent. in the poorest of these products.

It will be seen under these circumstances, that shock-resisting qualities in steel, while these qualities depend upon low sulphur and phosphorus for initial results, are variable over a wide range on other counts.

Before stating the reasons for the variations noted, it is necessary to observe that, for dependable results, and, in order to be able to predict the approximations of variation, the sulphur and phosphorus constituents must be suppressed as they are in these steels.

Referring now to the steels reported, the product E. 120 O shows the highest shock-resisting qualities, namely 1,987 foot-pounds per square inch, against 1,245 foot-pounds for E. F. 60 O. This is in the face of the fact that the E. F. 60 O is the finest grade of chrome-nickel steel, whereas the product E. 120 O is a cementing, case-hardening, nickel steel.

It is in the chemical composition of these steels that search must be made for the reason of the difference. The carbon content is 0.10 to 0.15 in the E. 120 O, nickel steel, but the carbon constituent is 0.20 to 0.25 in the E. F. 60 O chrome nickel steel.

The hardening effect of carbon is well understood. It is fair to expect that shock-resisting qualities will decrease as the steel is hardened by addition of carbon. The nickel content happens to be the same in both of these grades of steel. It holds at from 4.40 to 4.50 per cent. The effect of nickel, as such, must be the same in both specimens. If it is not possible to account in any other way for just the difference in shock-resisting qualities observed, it must not be forgotten that the E. F. 60 O steel holds 1.60 per cent. of chromium, whereas the E. 120 O steel is barren of chromium.

Examining the steel F. 48 O, which is higher in carbon and in chromium than E. F. 60 O steel, and devoid of nickel

TABLE A—KRUPP STEEL SHOCK TESTS

Brand	Pounds Per Square Inch, E. L.	Pounds Per Square Inch, T. S.	Per Cent. Elongation in Inches	Per Cent. Reduction of Oven	Shock Test Foot-Pound per Square Inch
E. F. 60 O, highest grade of chrome nickel steel	103,835	119,482	22.7	67	1,245
E. F. 34 O, grade of chrome nickel steel	102,413	127,020	20.7	60	1,006
F. 48 O, finest grade of chrome steel for structural purposes	105,248	132,000	16.7	58	772
E. 120 O, finest grade of nickel steel for case hardening	61,163	84,206	31	70	1,987
A. 7 J, finest grade of carbon steel for structural purposes	51,226	81,788	27.3	65	555
A. 9 J, special grade of carbon steel for use in crankshafts	66,853	105,685	17.7	60	361
C. 46 O, special steel for side frames of automobiles	88,047	113,792	23.5	65	900

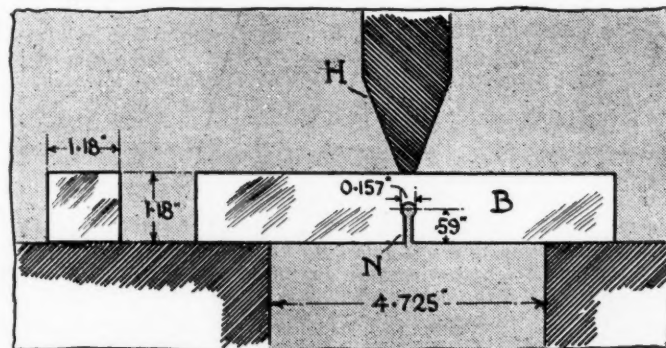


Fig. 2—Diagram showing size of test bar B and conditions surrounding tests of steels in Krupp laboratory for shock-resisting properties using the Charby pendulum apparatus

it will be seen that the shock resisting qualities fall to 772 foot-pounds per square inch. This reduction of shock ability is due first to the increase in carbon, second to the considerable chromium content, and third the absence of nickel, which element is present in the steel used in the comparison.

It might be said that nickel is superior to chromium, that carbon is detrimental and should be suppressed, and that increasing the number of the elements used adds materially to the uncertainties, but the statement if made would only be true from one angle of observation.

The fine grade of carbon steel A. 9. J., which is a steel for crankshafts, hence high in carbon but having no chromium or nickel, has shock-resisting qualities down to 361 foot-pounds per square inch, and in the face of the fact that this is a high value for carbon steel, only to be realized when the metalloids are low and the steel is well fabricated. It is evident that shock-resisting power reaches a low ebb in the absence of chromium or nickel if the carbon content is increased in order to get hardness for bearing purposes and strength to resist torsion, as in this example.

Were it possible to do without hardness for bearing purposes, lowering the carbon, all other things equal, would give the result of A. 7. J., increasing the shock-resisting power of the steel from 361 foot-pounds to 555 foot-pounds. But the addition of about 2.00 of chromium to the higher carbon steel brings the shock resistance up to 772 foot-pounds. Then lowering both carbon and chromium a little and adding 4.40 to 4.50 per cent. of nickel raises the shock-resistance to 1,245 foot-pounds, as the table shows, or, by lowering the carbon to the minimum and eliminating chromium the 4.40 to 4.50 per cent. of nickel in the steel affords almost the extreme of ductility, and, in this case at any rate, the shock-resisting qualities go up accordingly, reaching the high level of 1,987 foot-pounds. The only way apparent at the moment to get higher shock-resisting qualities lies in the increase in the nickel constituent, but this idea cannot be extended beyond 6 per cent. of nickel, without changing the characteristics of the steel, so that its use for purposes here referred to becomes out of the question.

There are practical reasons why it may not be desirable to take advantage of the very high shock-resisting qualities of E. 120 O, nickel steel, excepting for certain exacting undertakings resorting to the process of cementation to realize hardness of surface. In the same way, choice may fall upon A 9 J. carbon steel with its relatively low shock-resisting qualities, but it would be fatal to either of these undertakings were a steel substituted, one with an excess of sulphur or phosphorus, for then, instead of the definite values here given for shock-resisting qualities, great uncertainty would creep in, excepting that a much lower shock-resisting power would be assured.

Constructional Features Acquit Driver

The peculiar case of a German automobilist who was acquitted of violation of a local anti-smoke ordinance has been closed recently, and special interest attaches to the case, as the decision in favor of the defendant was brought about by constructional features of the vehicle involved. The driver of the vehicle, on June 13, 1912, passed through the village of Vohwinkel and his car developed intense smoke and an odious smell, and on June 26 he was sentenced to pay a fine of 5 marks (\$1.25). The driver appealed against this decision and demanded that the case be taken into court, he having been sentenced by the police authorities. When questioned before the general sessions, the defendant admitted that on the day in question his car had for some time emitted large quantities of smoke and an evil odor; but at the same time he maintained that he could not avert these nuisances, due to the peculiar construction of the machine. On June 13, he said, he drove down a steep hill into Vohwinkel, and it was

necessary for him to have the motor clutched to the transmission with the low gear in mesh, to produce the needed braking effect on the hill. As the motor must not give any power impulses, he could not give it any gas, but the automatic lubricating system continued to supply the cylinders with oil which was stored in the combustion chambers. As soon as the truck arrived on level ground, he gave the motor gas and the cylinders, beginning to work, burned the considerable quantities of oil which had accumulated during the travel down-hill, thereby giving rise to smoke and odor production. This statement of the defendant regarding the impossibility to avert the nuisances with which he was charged was corroborated by a technical expert under oath, whereupon the court found that it had been impossible for the driver to prevent his car from producing the smoke and smell. The defendant was then acquitted of the charge and the state was charged with the cost of the proceedings. This course of the events was, to a large extent, due to the skill of the lawyer representing the defendant, who proved very capable in obtaining the material evidence and the corroboration of the expert, upon which the defendant was acquitted.

Double-Disk Truck Wheel

How to make wheels for trucks so well that they will survive the evils of service without using rubber for tires is the problem which is being struggled with abroad. Fig. 3 shows, in part section, a plan that is being considered. The disks of steel look like a cone clutch, so far as shape is concerned, as it is used to transmit power from a motor to gearbox. These clutch faces press against the bevels of the wooden felloe. The steel tire is shrunk over the wood felloe and the steel discs are bolted to flanges of the hub and also held against each other near the felloe by a series of bolts. Resiliency is secured both by the inherent qualities of the metal and by the mounting of the felloe which is wedge-like in form. The wedge formation of the felloe will put a decided tension on the bolts which connect the two steel disks and therefore they are closely spaced as may be seen in the illustration.

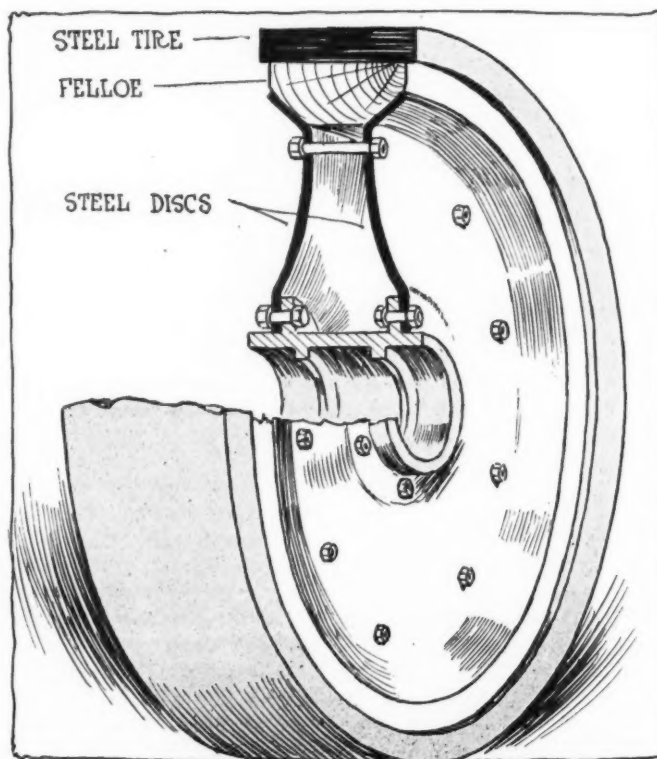
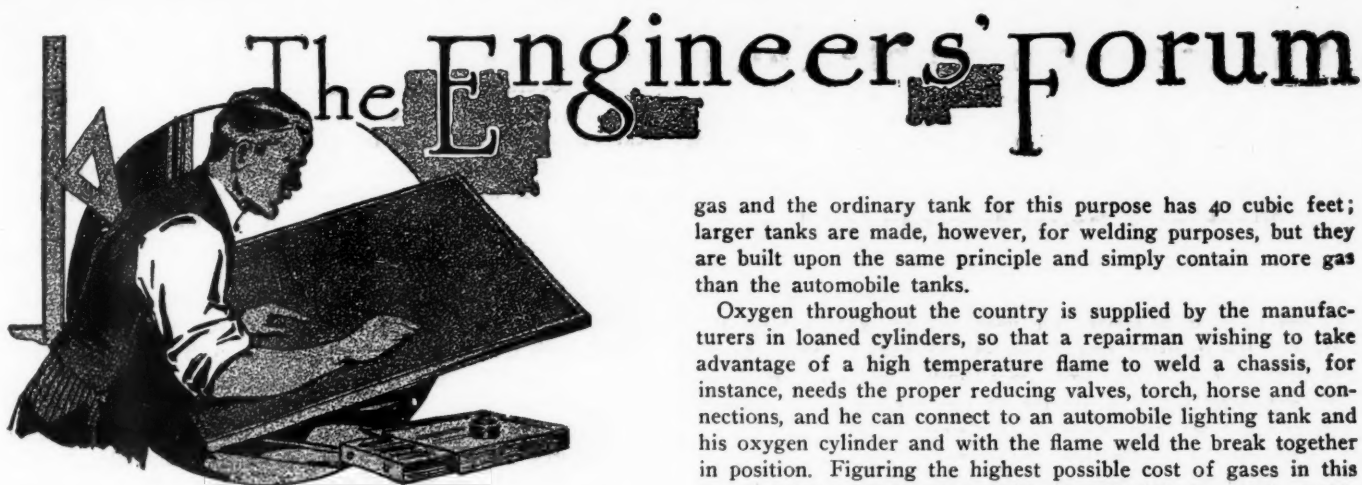


Fig. 3—Sectional view of double-disk truck wheel designed to obviate necessity for rubber truck tires



Autogenous Welding May Be Made a Boon to the Repairman as Well as to the Manufacturer

M. Keith Dunham Comments on Mr. Tucker's Article in THE AUTOMOBILE for October 17, on European Welding Practice.

BOSTON, MASS.—Editor THE AUTOMOBILE:—In the issue of THE AUTOMOBILE for October 17, the article on Welding, European Methods and Uses, by Mr. Tucker, is extremely interesting and Mr. Tucker shows familiarity with his subject. Especially to the manufacturer the article is of more interest than to the repairman. While the English language is supposedly the same, we in Yankee Land certainly do have a different method of expression than our cousin across the water, and a repairman, unless he has studied welding carefully, will find the article by Mr. Tucker shooting over his head.

Autogenous welding is one of the most simple things possible to understand; used in its most common form with oxygen and acetylene there is a heat of approximately 6,300 degrees Fahrenheit concentrated in a fine point. With this heat any of the commercial metals may be united merely by fusing together the edges (which are butted) and filling in the depression made by any butt weld with a stick or a rod of the same material. Oftentimes a repairman, on first seeing the process, confuses this feeding-in rod with solder, inasmuch as the rod flows freely under the flame. There is no comparison, of course, with solder, as the parts are thoroughly fused together and made homogeneous.

Mr. Tucker states in his heading Autogenous Welding System that in practice a proportion of four volumes of acetylene to five of oxygen gives better results than the theoretical two volumes of acetylene to five of oxygen. The best authorities in this country agree that the proportions of oxygen and acetylene are chemically fixed and to produce a neutral welding flame the consumption of gases will be approximately the same in any torch. On a pressure type blowpipe there is no question that the flame is more easily kept neutral than in an injector type. Any intelligent workman, after a 15-minute explanation, can readily adjust a well-made torch so that his proportions of oxygen and acetylene are correct, or, in other words, so that he has a neutral welding flame.

In this section of the country, and to a large extent the same holds true throughout the United States, the trend of the times is toward the use of safety-storage acetylene rather than generators, especially where there is only repair work to be done. In nine repair shops in the city of Boston devoted to repairs and manufacturing by the oxy-acetylene process, eight use safety-storage acetylene.

Every automobilist is familiar with safety-storage acetylene: to him it is commonly known as Prest-O-Lite or Searchlight

gas and the ordinary tank for this purpose has 40 cubic feet; larger tanks are made, however, for welding purposes, but they are built upon the same principle and simply contain more gas than the automobile tanks.

Oxygen throughout the country is supplied by the manufacturers in loaned cylinders, so that a repairman wishing to take advantage of a high temperature flame to weld a chassis, for instance, needs the proper reducing valves, torch, hose and connections, and he can connect to an automobile lighting tank and his oxygen cylinder and with the flame weld the break together in position. Figuring the highest possible cost of gases in this section of the country they could not exceed \$2 for a job of this character, so that Mr. Tucker's claim that the safety-storage system is expensive will not be admitted by repairmen in this country.

The use of the tank system in England may be impractical, but in the United States the rapid development of the acetylene companies, manufacturing gas and selling it by this system, is conclusive proof that it is thoroughly practical.

Automobile parts, as a rule, are costly enough so that the price of the gas in a repair job is not an item. If the gas costs 50 cents by the generator method to weld an automobile cylinder, the tank system does not prohibit the automobile repairman from using it merely because the gas in this way would cost 75 cents on salvaging an article worth at least \$15 and he can well afford to spend \$1 on the cost of raw materials and supplies.

The chief thing for the repairman to remember is that with the safety-storage system of acetylene and the use of high pressure oxygen in cylinders there is no care whatever with his apparatus and it is ready for use when he wants it merely by opening a valve and when he closes the valve the gas does not deteriorate and the outfit is ready any time for an emergency. With the generator system considerable care is required and a large investment necessary, which to the ordinary repairman is almost prohibitive.

The garage with a welding outfit as a part of its shop equipment will always find plenty of uses for it, have the reputation of getting its customers out of trouble quickly and thoroughly and will add materially to its income—M. KEITH DUNHAM, general manager Waterhouse Welding Company.

The Use of Mathematics by Engineers

In an editorial article on this subject *Engineering*, of London, recalls some remarks once made by Rankine in accounting for the disrepute in which mathematics had fallen among practical engineers, to the effect that any theory of engineering, to be worthy of the name, must take cognizance of the whole of the facts and factors concerned, and not merely of those which it is possible to put into mathematical form. By sinning against this rule, the mathematics advanced in each case become subject to contempt exactly in the measure as too much is claimed for them. Every practical engineer knows indeed far more than it is possible for him to formulate in equations. Bit by bit, as experience accumulates, certain of these factors become amenable to mathematical methods, but in the initial stages of a novel development good guesswork is almost the only guide on which the practical engineer can rely. There is, however, unquestionably an immense mass of data pigeon-holed uselessly in the archives of manufacturers simply because the mathematical knowledge required for analyzing these records effectively is not possessed or applied by the technical staff. Much would be gained if such data were brought to public notice.

The Interchangeable Body

Used Mainly by Moderately Wealthy, as Very Rich Can Afford Separate Machines--Superfluous for Others

INTERCHANGEABLE bodies for automobiles so that the car can be kept in service the year around are a subject that interests the industry from a variety of angles. Save for the concerns dealing in very small cars handled in New York, every company asserts that a greater or less proportion of its customers use more than one body on a single chassis.

In the case of the Peerless, for instance, the proportion is said to run as high as 50 per cent. In the Cadillac experience it is 40 per cent. In other cases it runs about 15 per cent., according to statements gleaned from sales managers, but the majority is lower and the average of all the estimates would be not more than 10 per cent.

Definite figures are more difficult to obtain than even the sales managers think, for so many factors enter into the proposition that at best the figures given by the companies themselves are little better than guess work.

The business in extra bodies is not increasing, according to the generally expressed opinion along the row. The reason for that conclusion is double-headed, and is as follows: The man who can afford to purchase an expensive car, can also afford to own a supplementary automobile. Thus, the wealthy motorist may own a powerful, costly touring car for use 6 or 8 months in the year and an inclosed car for winter use. The man of moderate means who has an automobile may feel that he can not afford the extra car, but the same reason would lead him away from the idea of using an extra body. With the very wealthy no useful purpose is served and with the man of moderate means no solution to the problem is presented by the extra body.

Thus the use of the interchangeable body is limited in its scope and extent to a few lines. The limousine is growing in demand for year round service by the class of buyers who use automobiles from the necessities of their station in life. With this class the limousine, having a large carrying capacity and equipped with a motor larger than that used in the average town car, is a favorite. The class referred to has plenty of money, but its members are not rated as very wealthy. The multi-millionaire class is equipped with a variety of automobiles for various sea-

sons and uses. In neither of the above-mentioned classes is there any appreciable call for interchangeable bodies.

The moderately wealthy class is where the interchangeable body has its greatest use. The man who can spend \$5,000 a year on the operation of his car is the one who presents the most fertile field for extra bodies. He must have a chauffeur, for the owner who drives hardly fancies running a town car or even a limousine and after deducting the chauffeur's pay, the appropriation of \$5,000 would hardly warrant the ownership of two cars.

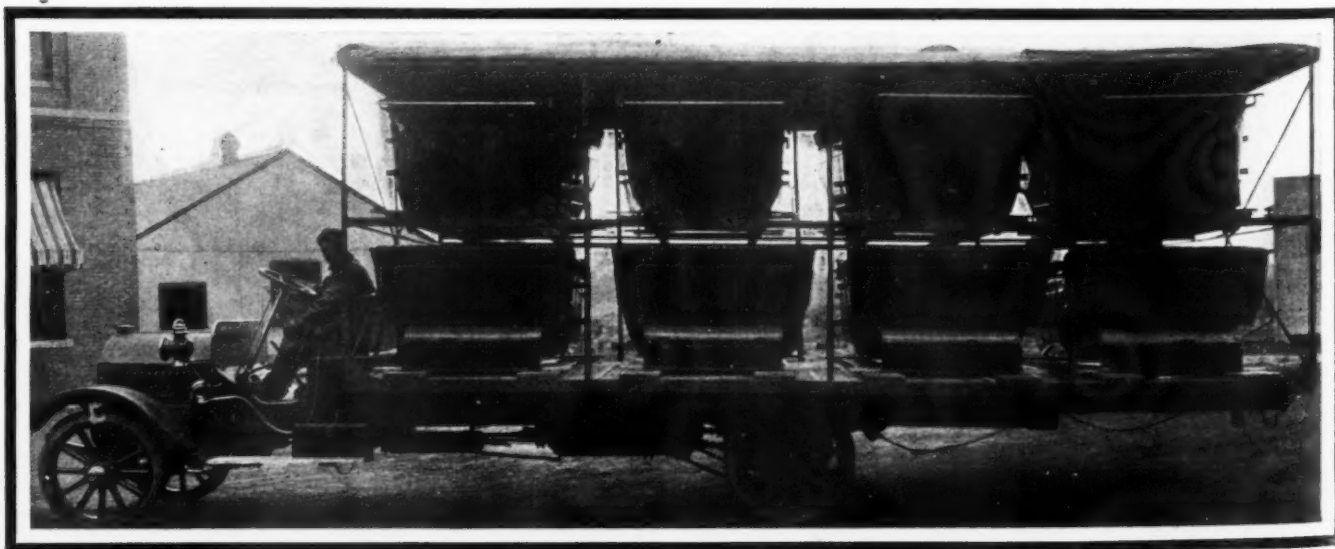
The man of comfortable means who owns a car uses it for pleasure in very large proportion and drives himself. There is only a small market for extra bodies in such cases and practically none at all where the expenses of running the car itself represent all the man can afford to pay for automobiling.

Nevertheless the business constitutes a factor in the automobile industry and there are probably 5,000 automobiles in New York and its immediately contiguous territory which use an extra body. In the great establishments of the body-builders in and about New York there are storage facilities for 2,000 bodies. The remainder are kept in public and private garages, barns and even attics. Fewer customers in proportion to the total number who own extra bodies had the change made from one type to the other in 1911 than they did in 1910. This indicates that they have added to their automobile equipment, rendering the change unnecessary or that they are using the enclosed type more freely in summer than heretofore. Approximate figures show that of the stored bodies about 70 per cent. are for touring cars. Whether this percentage is carried out is uncertain in the absence of a detailed canvass among the thousands of owners.

Novel Way of Transporting Bodies

The R-C-H Corporation, Detroit, Mich., uses a special type of truck for the transportation of bodies between the body factory and the assembling plant. The truck is here illustrated and has a wheelbase of 196 inches and an overall length of 21 feet, the body being 10 feet, 6 inches wide and 8 feet, 10 inches high. This gives space for the superimposed arrangement of two rows of four R-C-H touring car bodies each, or of 11 roadster bodies, each of which is crated in an individual compartment. The peculiar construction of the body which is specially adapted for its purpose, gives the truck a side appearance not unlike the front of an aeroplane. The vehicle makes four or five trips a day, each of which is 16 miles, and travels at a rate of 12 miles an hour.

It is easily seen that the use of this single freight automobile for body transportation greatly facilitates the handling of this part of car equipment.



Special truck used by the R-C-H Corporation, Detroit, Mich., for carrying bodies from the body factory to the assembling plant

Monster Gotham Garage

Remodeled Boarding Stable Has 60,000 Square Feet of Floor Space and Storing Capacity for 300 Automobiles

ONE of the largest garages in New York City, in which at times 300 cars are housed and where automobiles pass the door sometimes at the rate of one a minute, has been developed from a huge boarding stable. This is the Joscelyn garage, 120 West Fifty-second street, which is described below, in order to illustrate the possibilities of creating a modern garage out of a stable.

As the accompanying floor plan shows, the three-story building which is 200 by 100 feet, with the longer side facing the street, is divided into three portions, the last compartment to the right being still used as a boarding stable by the former owner of the building. The garage building proper consists of three sections divided by two fire-walls into a right and left storage place on each floor, while a central space accommodates the elevator, the entrance on the ground floor and the chauffeurs' rooms on the two floors above, while on the top floor this central space is also devoted to the garage work.

Caring for Chauffeurs' Comfort

The floor plan while illustrating the arrangement of elevator and wash rack, which of course is the same for all floors, illustrates the street floor especially, on which the entrance is formed between the two middle fire walls, and the superintendent's office located adjacent to it. The locations of patrons' telephone and checker's office are also shown and attention is called to the fact that the checker is situated in a wooden box some 15 feet above the floor. This arrangement has been illustrated on page 482, THE AUTOMOBILE, of September 5. Next to the telephone booth there is a small stairway which winds up to the chauffeurs' rooms on the two floors above. The floor above the street level contains the chauffeurs' barber shop and billiard room, while on the next floor facilities for reading and writing have been provided.

A rigid system of storing cars and accessories has been evolved

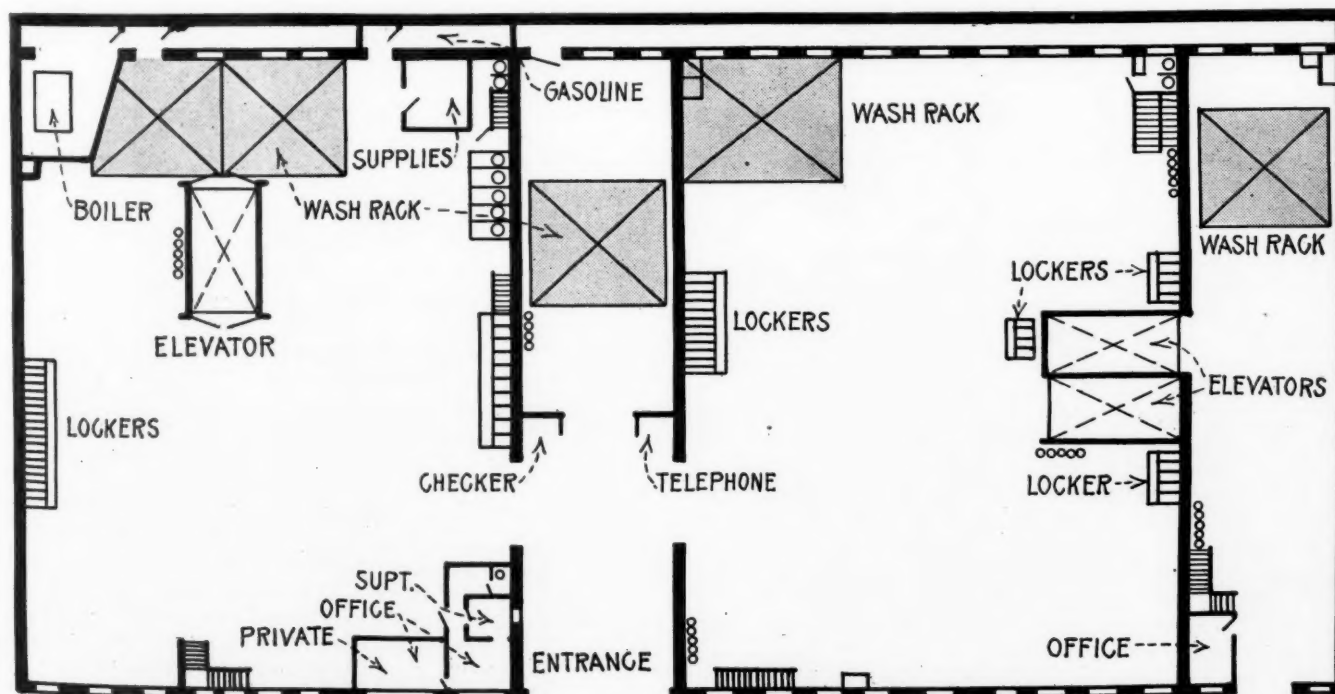
at this garage. It is controlled by the chauffeurs themselves, and ordinarily, has nothing to do with the garage management. Each chauffeur is given two lockers, one for keeping his spare tires, etc., and one for his clothes. As to the car storage system, the entire garage has been divided into individual spaces of equal size which are capable of accommodating a car of any dimension. Each car always uses the same space. The cars are arranged along the walls, whereby a passageway in the middle portion of each floor compartment is left free. The lockers which are also arranged along the walls, are located as shown in the plan.

To prevent all interference in the system of operating the lockers, each locker is fitted with a single key, this being given to the chauffeur, while a master key is kept in the office of the superintendent. This permits of opening the locker for the chauffeur in case of his losing or misplacing his own key.

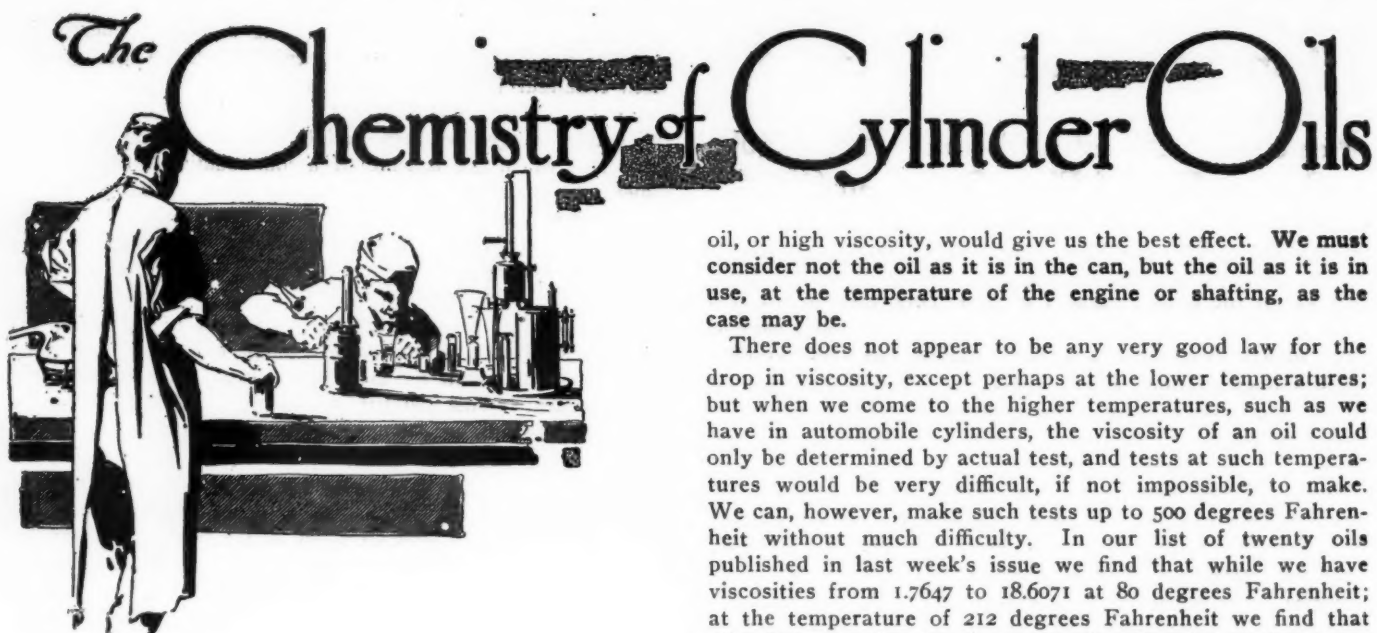
While the garage does not operate a repair or supply department, it furnishes its patrons with supplies by means of the following system. If a client is in need of a part or material, the garage undertakes to send an order to the dealer who handles the required goods, and after delivering it to the patron, charges it to him on his monthly bill. A supply room on the ground floor serves for the storage of accessories left by transient clients for a short time.

As above stated, the capacity of the garage is 300 cars, but at present only about 190 are kept there, these requiring the services of about 100 men, part of whom work in day time and part in the night. In addition to the facilities named before, there are others that a garage with so large a clientele cannot do without. An efficient steam-heating system is installed throughout the buildings, the steam being conducted in long, coiled pipes along the walls, which are brick-covered, thereby providing a better heat insulating medium than concrete would. The appliances for fire prevention and protection are in accordance with the orders of the city fire department, and they include sand pails and chemical extinguishers. The illumination, in addition to daylight entering through tall windows, is by incandescent lights, principally drop lights, which so far seem to present the most efficient means for garage lighting.

All the equipment has been designed or rather installed with the special purposes of garage work in view, and it can only be said that the men in charge of the enterprise have solved their problem in an excellent manner.



Floor plan of Joscelyn garage which was constructed by adapting a large boarding stable for the specific requirements of automobiles



Viscosity of the Oil Does Not Affect the Thoroughness of Engine Cylinder Lubrication

Part II

Being the second of a series of articles on cylinder oils which will appear from week to week. Discussions are invited and the columns of THE AUTOMOBILE are open to pertinent criticisms.

By W. Jones

IN the twenty samples of cylinder oils which we have so far tested it is shown that the viscosity has no relation to the specific gravity, nor does the carbonizable carbon depend upon this in the least. We therefore consider that the specific gravity will not have much, if any, value in determining which of a number of oils would be likely to give the best results in practical use in the engine.

The viscosity, however, is of somewhat more importance, the carbon figure appearing to more nearly follow the viscosity, although it does not do so entirely. We would, therefore, give more consideration to the viscosity on this account, and also to a certain extent for the lubricating value of the oil.

It is generally considered that the viscosity of an oil largely affects its lubricating value. That the thicker the oil is, the better lubricant we have; that such an oil would tend to keep the two wearing surfaces apart better than a thin oil. That that would be the case under some conditions, undoubtedly is true; but it would not necessarily be the case under all conditions. For instance, if we wish to lubricate a very heavy shaft, it is frequently considered to be necessary to use a very heavy or thick oil, so as to help bear up the shaft, and prevent its weight from pressing through the film of oil which keeps the two surfaces apart. Now, if this shaft was moving only slowly, this argument would have some weight. But if the shaft is to revolve rapidly, a much thinner oil could be substituted to advantage, as it would be found that the thinner oil would be carried under the shaft much more easily than the thicker, and would therefore preserve the film more effectively.

Then again, we must consider the effect of heat on the viscosity of the oil, even if it should be found that a thick

oil, or high viscosity, would give us the best effect. We must consider not the oil as it is in the can, but the oil as it is in use, at the temperature of the engine or shafting, as the case may be.

There does not appear to be any very good law for the drop in viscosity, except perhaps at the lower temperatures; but when we come to the higher temperatures, such as we have in automobile cylinders, the viscosity of an oil could only be determined by actual test, and tests at such temperatures would be very difficult, if not impossible, to make. We can, however, make such tests up to 500 degrees Fahrenheit without much difficulty. In our list of twenty oils published in last week's issue we find that while we have viscosities from 1.7647 to 18.6071 at 80 degrees Fahrenheit; at the temperature of 212 degrees Fahrenheit we find that this difference has been very much reduced, and that these two extreme cases now stand at 1.1428 and 2, showing that they not only have both dropped, but that the higher the viscosity is at the low temperature the more quickly it drops, and this we find to be the case generally throughout the list.

If we should attempt to formulate a law based on these figures we would find that these oils would all pass the unity mark at temperatures between about 250 degrees Fahrenheit and 400 degrees Fahrenheit. This we do not find to be the case. No. 1867, Table A1, being the lowest viscosity at 80 degrees Fahrenheit, is 1.7647; at 212 degrees Fahrenheit it is 1.1428, and at 350 degrees Fahrenheit we still have a viscosity of 1.0357, while theoretically it should reach unity at about 280 degrees Fahrenheit.

Again in No. 1870, which at 80 degrees Fahrenheit is 6.1764, at 212 is 1.4285, and at 350 degrees Fahrenheit we have the same figure, 1.0357. This oil should pass unity at about 270 degrees Fahrenheit. Now, taking the other extreme in No. 1896e at 80 degrees Fahrenheit we have 18.6071; at 212 degrees Fahrenheit we have 2; at 350 degrees Fahrenheit we have 1.1071; at 400 degrees Fahrenheit we have 1.0714; and at 500 degrees Fahrenheit we have 1.0357.

If we should attempt to calculate the drop on this oil from the drop between 80 degrees Fahrenheit and 212 degrees Fahrenheit, we might expect it to pass unity at about 250 degrees Fahrenheit. This shows that all the laws on the subject are not of much use.

We notice that in these three oils we have arrived at the same figure, but at different temperatures. In the first two we got there at the temperature of 350 degrees Fahrenheit, while in the last we only got there at 500 degrees Fahrenheit. We also notice here that at the temperature of 350 degrees Fahrenheit there is no difference between the two first oils, while in the third there is a difference of 0.0714, or between 1.0357 for the first two and 1.1071 for the third. Again, we see in the first two oils, No. 1867 and No. 1870, we have at 80 degrees Fahrenheit for the first 1.7647, and for the second 6.1764, while at 350 degrees Fahrenheit we have the same figure, 1.0357.

From all this we conclude that the drop in viscosity from low to high temperatures is very much like the dilution of a solution, that however much we may dilute it, we never reach pure water. That the oil will never reach the viscosity of water, although it may be considered to reach this point for all practical purposes at temperatures above 500 degrees Fahrenheit, and therefore all oils used in automobile engine cylinders have practically the same viscosity in the cylinder

when in operation. That it makes little or no difference as far as the viscosity is concerned, if we use No. 1867 with a viscosity of 1.7647, or No. 1870, with a viscosity of 6.1764. The lubrication in the cylinders would be, as far as the viscosity is concerned, the same.

After this consideration of the viscosity bearing on the the lubrication value of the oil, we would naturally look at the list from a different standpoint than before. We now can see why the oil No. 1867, at the top of the list, has given such universal satisfaction. We would now be more likely to select an oil with a low viscosity figure. We should not, however, depend entirely upon this one test, for, as we have already noted, the carbon figure does not entirely follow the viscosity, therefore the carbon figure should always be taken into account.

There are also some other determinations to be considered, such as the acidity and the effect of these acids on the metal of the cylinder. These subjects will be taken up later.

Volatility of Petroleum Distillates

NOTHING leads to more exact knowledge of the indefinite character of petroleum compounds than the information which comes during the process of making flash and fire tests. These hydrocarbon compounds of the methane paraffin series are only indefinite, however, in their proportions of carbon and hydrogen. Confining the discussion to refined hydrocarbon products, it is a fair inference that the compositions of the products are substantially limited to fractions composed of carbon and hydrogen, with but mere traces of other elements, unless, on occasions, it will be found that a small content of oxygen will be present in the mixtures.

In conducting flash tests, the flash point depends largely upon the rate of the heating of the liquid. The equipment used for this purpose consists merely of a small pan or dish partly filled with sand, with a royal Berlin porcelain dish about 2.75 inches in diameter and 1 inch deep, resting upon and slightly bedded in the sand, in which the liquid to be tested is placed. Heat is applied to the under side of the protecting pan by means of a gas flame from a Bunsen burner, and a thermometer is so placed that the mercury bulb rests in the center of the porcelain dish, so held in place by any suitable means, as a frame, that the bulb of the thermometer will be submerged in the liquid, but it is not permitted to contact with the bottom of the porcelain dish. Provision must be made to apply flame to the surface of the liquid to be tested; this may be done by lighting the end of a length of fine string or coarse thread; but a needle flame from a gas burner, with a rubber hose connection, is better. Flash test apparatus is stock among dealers in laboratory equipment.

In dealing with hydrocarbon liquids, when it is desired to conduct flash tests, a sufficient knowledge of the character-

istics of the liquid is usually available to enable the tester to make a surmise of the probability, thus saving a long exploration. But if the heat applied is at a rapid rate the flash point will be found at a relatively low temperature. If the heat is applied at a very gradual rate the flash point will be determined at a relatively high temperature. And these differences will be noted for all of the hydrocarbon liquids.

The reason why the flash test affords different temperatures depending upon the rate of the application of the heat is that the constituent fractions of the liquid are not all of the same volatility. If, for illustration, a sample of 150 degrees Fahrenheit fire test petroleum is taken, even though it proves to be of this quality, the fact remains that the flash point can be developed at a temperature considerably lower than it should be for a 150-degree Fahrenheit fire test petroleum product; it is a mere matter of urging the heat. If the heat is urged, the more volatile constituents will be evaporated fast enough to evolve enough vapor to support a flash. If the heat is applied at a very gradual rate the more volatile constituents will be evolved at such a slow rate that they will float away in the air, never affording a sufficient presence of vapor to make a flashing mixture.

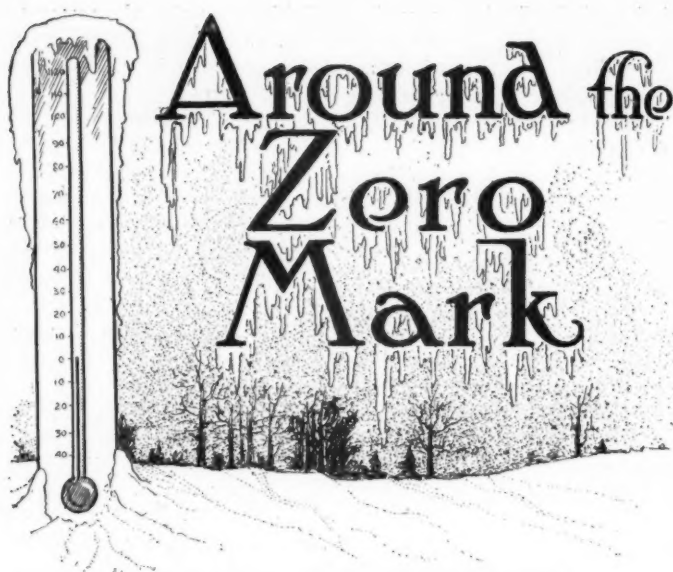
The lower the flash point of the liquid, the greater will be the difficulty of conducting a proper test. This is partly on account of the restriction in the range of the temperature; but, for the most part, it is due to larger proportions of the more volatile fractions of the petroleum in the mixture. Unless the heating is done with care at a slow and gradual rate, if the liquid is of the lighter fractions of the petroleum, the flash point and the burning point will merge. It will be understood, of course, that the only difference between the flash point and the fire point of a liquid lies in the fact that with a mere flash combustion is not supported; the fire point, on the other hand, represents the temperature at which combustion is supported. It is not out of place to infer, from what has already been said, that if the liquid is a close fraction distilled within a narrow range of the temperature the flash point and the fire points will be close together. Heating at a rapid rate, since it produces a considerable volume of the more volatile constituents of the liquid, promotes the merging of the flash point and the fire point, due to the considerable amount of the heat of the subsequent flashing, thereby releasing enough of heat to promote a burning temperature in the body of the liquid. Frequent flashing also has the same effect.

The rate of the heating of the liquid, under the circumstances, must be uniformly maintained for tests of this sort; otherwise the readings, both for the flash and the fire test, will be so variable in their character that the comparison of tests will be for naught. It is the practice in some laboratories to raise the heat at a rate of 15 degrees Fahrenheit per minute; this is for all petroleum products which have a fire test of 300 degrees Fahrenheit or over.

TABLE A1—ANALYSES OF AUTOMOBILE CYLINDER OILS—BY W. JONES

No.	Specific Gravity	Specific Viscosity at 80° F.	Specific Viscosity at 212° F.	Carbon per cent	Flash Point °F.	Fire Point °F.	Specific Viscosity at 350° F.	Acidity	Mgs. Iron Loss per 100cc Oil	Sulphuric Acid%
1867.....	0.8684	1.7647	1.1428	0.30	325	358	1.0357	.00294	0	0
1868.....	0.8984	3.2353	1.3214	0.70	384	432	.....	.00441	2.66	0
1869.....	0.8992	4.1764	1.3571	0.75	404	460	.....	.00588	2.00	0
1870.....	0.8948	6.1764	1.4285	1.03	422	474	1.0357	.00490	1.33	0
1890/a.....	0.8755	5.7657	1.4285	0.80	458	504	.....	.....	0	0
1890/b.....	0.8651	3.8571	1.3035	0.72	448	510	.....	.....	1.33	0
1894/a.....	0.8985	3.5714	1.2857	0.95	408	454	.....	.....	1.33	0
1894/b.....	0.9103	4.4643	1.2500	1.70	428	474	.....	.....	2.00	0
1896/a.....	0.8860	2.2500	1.3214	0.65	420	476	.....	.00249	0	0
1896/b.....	0.8866	3.6428	1.2500	1.00	424	476	.....	.....	0	0
1896/c.....	0.8868	4.6071	1.4285	1.10	428	478	.....	.....	2.66	0
1896/d.....	0.8874	6.3214	1.4285	1.10	428	490	.....	.....	2.66	0
1896/e.....	0.8976	18.6071	2.0000	2.35	454	526	*1.1071	.00441	0	0
1897.....	0.8747	3.8571	1.4285	0.44	438	494	.....	.00294	0	0
1914/a.....	0.8953	5.1428	1.2857	0.52	412	464	.....	.....	1.33	0
1914/b.....	0.8756	4.1085	1.3571	0.70	434	490	.....	.01029	3.33	.0324
1914/c.....	0.8801	7.5353	1.5357	0.93	450	506	.....	.....	3.33	.0223
1934.....	0.8705	3.3928	1.2143	0.55	440	494	.....	.....	0	0
1935.....	0.8777	3.5714	1.2500	0.78	438	486	.....	.....	0	0
1936.....	0.8738	3.5714	1.2500	0.53	442	494	.....	.01225	4.00	.0286

*At 400° F., 1.0714; at 500° F., 1.0357.



Experiences of an Automobilist in Cold Weather Which Bring Out the Importance of Proper Safety Measures

By Barry MacNutt

Readers of THE AUTOMOBILE are invited to submit accounts of cold-weather experiences and criticisms of those appearing in these columns.

SOUTH BETHLEHEM, PA., Nov. 4—In the past 2 or 3 years, the practice of driving automobiles the year around has become more and more general and I think there are now but few owners of cars who lay them up during winter weather. There is no question, however, but that there are difficulties met with in winter which do not obtain during the summer months and the following experiences relate most of the difficulties that I have had in operating my car in cold weather. With the exception of the tire trouble, all of my difficulties may be obviated and I hope that those who drive cars under similar conditions may profit by my experiences.

For 2 or 3 years I have kept my car in a garage which is heated by hot water and therefore have done away with one of the most trying annoyances that the man who takes care of his own car has to encounter. Nothing is more uncomfortable than to work around a car with the thermometer in the garage well under freezing, and never is it more exasperating to attempt to start a cold engine than in the morning when one is in a hurry to get to his office.

But unfortunately I am compelled to leave my car standing outside for 3 or 4 hours, morning and afternoon, in an exposed position and it is this exposure of the car to the cold which has caused most of my difficulties.

With the thermometer below 15 degrees and the engine cold, I find it almost impossible to start the car using the ordinary grade of gasoline, about 65 degrees Baumé. I have flooded the carbureter, injected raw gasoline into the cylinders, etc., but with no result. A friend of mine has compounded a mixture of hydrocarbons of very low boiling point which I have found will start the car satisfactorily at all but extremely low temperatures, it being only necessary to inject about a teaspoonful of the mixture into each cylinder. When the temperature has been in the neighborhood of 10 degrees below zero, I have found that I could only start the car by using gas, either illuminating gas or acetylene gas from the tank, allowing the gas to flow into the intake and running the engine until it had warmed up sufficiently to produce the necessary vaporization of the gasoline.

On one occasion I was unable to obtain any gasoline flow from the tank to the carbureter. The car was hauled to the

garage and upon investigation I found that the feed pipe had become clogged with ice. This was explained by the fact that in the earlier part of the day there had been a severe sleet storm. The filler cap on the gasoline tank, which is exposed, had lost its gasket and undoubtedly enough water had leaked into the gasoline tank to cause the trouble.

For some years I have used a solution of denatured alcohol in water in the radiator during the winter weather. This I have found entirely satisfactory, the solution being non-corrosive and inexpensive, 5 gallons of denatured alcohol sufficing for two seasons.

A very peculiar thing happened once during last winter. After starting the engine and running the car for about 15 minutes, I found the engine becoming very hot and soon traced the trouble to lack of circulation of the cooling water. Upon investigation I found that the cooling water had frozen in the form of slush in the pump preventing its action, and yet the solution in the radiator was unfrozen. This was evidently due to the fact that the solution at the pump was weaker in alcohol than that in the radiator, but I am unable to account for this effect. This experience was not repeated during the winter and it would be interesting to know if other automobilists have noticed this phenomenon of a partial separation of the alcohol from the water in one part of the circulating system.

Another difficulty that I have encountered is the lowering of the E. M. F. of the dry cells used for ignition. This lowering of the E. M. F. of the dry cells by reduction of temperature is only serious when three-quarters of the life of a dry cell has been exhausted. Under these conditions, a dry cell which will give a sufficiently high E. M. F. at ordinary temperatures is practically worthless at a temperature around zero. The lowering of the E. M. F. of a storage cell is not so marked as that of a dry cell, but there is danger in the use of storage cells of the electrolyte freezing, the freezing point of the solution of sulphuric acid used in a storage cell being about 10 degrees Centigrade.

I think that few drivers realize the great danger that exists in running an automobile engine in a confined space where there is not a large amount of fresh air to mix with the exhaust gases. I knew, of course, of the danger from inhaling carbon monoxide but did not have brought home to me the very small amount of this gas necessary to produce a toxic effect until I had had the following experience. I was tuning up the carbureter, running the engine with the car in the garage, and had left one of the large entrance doors open about a foot and also had the side door of the garage open. I happened to be standing in such a position that the draft blew the exhaust gases past me. In 5 minutes I began to feel dizzy and, realizing the trouble, hastily left the garage and got into fresh air. But for 3 hours I was very sick with the symptomatic nausea and headache of carbon monoxide poisoning. One may be sure that since then I leave the doors of the garage wide open when it is necessary to run the engine while in the garage.

Carbon Monoxide in the Muffler

Of course, if the carbureter is properly adjusted the amount of carbon monoxide in the exhaust of a gasoline engine is very small, provided the gas does not come in contact with hot carbon which reduces the carbon dioxide to carbon monoxide. As the muffler of an automobile engine is always more or less foul with soot and as this soot becomes highly heated by the exhaust, there is reason to suppose that under these conditions quite a large amount of carbon dioxide is reduced to carbon monoxide and so, even with a well adjusted carbureter, there must be a fairly large production of carbon monoxide in the muffler.

The fact that rubber becomes hard and inelastic at low temperatures is, of course, well known, and I frequently notice an in-elasticity of the horn bulb on very cold days, the bulb taking a long time to regain its normal shape after having been squeezed. It is fortunate that during the coldest weather there is usually a good layer of snow on the ground which covers up the sharp stones in the roads; for one can see that, as the

Among the New Books

Works Which Have Recently Appeared That Should Appeal to Automobilists as Well as Those in the Industry

CARE AND OPERATION OF AUTOMOBILES. By Morris A. Hall, American Society of Mechanical Engineers. Published by the American School of Correspondence, Chicago, Ill. 140 9 1-2 by 6 1-2-inch pages, with 69 illustrations. Cloth, \$1.40.

The author has intended this work for the private owner who desires to take care of his own car and thus minimize the expenses of its upkeep. The book is divided into two sections, the first deals with private garages and the repairs which may be safely undertaken by the amateur; the second treats of the automobile itself and includes instructions on the proper management of the car as well as its construction. There is nothing complicated or technical about the style in which the author gives his information, the book being made purposely elementary throughout. The private owner who is not an automobile expert will find much that is useful knowledge in its pages.

GASOLINE ENGINES, THEIR OPERATION, USE AND CARE. By A. Hyatt Verrill. Published by The Norman W. Henley Publishing Company, New York City. 320 5 by 7 1-2-inch pages, with 150 illustrations. Cloth, \$1.50.

As a comparative study of the different devices used in the gas engine this work should be of value to the student although in some parts the author has neglected to take into consideration the steps made in recent years. This is notably the case in speaking of automatic intake valves of which mechanical errors we have seen the last. In this connection he states that "several excellent motors utilize this system." A few pages further on, however, he gives an excellent and detailed description of the Knight sleeve valve as well as of some of the more advanced types of rotary valve. The rudimentary principles are carefully studied and while the book may not be recommended for the advanced student or one who has followed the industry from day to day, it should prove a satisfactory text book for the beginner.

ENERGY AND VOLTAGE DIAGRAM OF LARGE GAS ENGINES: THEIR USE AND LAYOUT. By Paul L. Joslyn. Published by The Gas Engine Publishing Company, Cincinnati, O. 70 pages, with numerous diagrams and tables. Cloth, \$2.

The designer of large gas engines has to consider many things which on small engines are often left to be worked out after the engine has been built in its first form. With small engines, it is not so expensive or so difficult to change some points, and

it frequently happens that very radical changes in construction are so effected. But with the engine of several thousand horsepower, it is impossible to do this. So far as can be done, everything must be worked out in advance. Castings and machine work run into a large amount of money on engines working on blast furnace gas, and to scrap a cylinder or a bed casting because some change is found necessary may amount to several thousands of dollars in initial expense, manufacturing cost, delays, etc. In this book, the author gives the methods of laying out energy and velocity diagrams for large engines operating on blast furnace, producer or natural gas, with instructions as to their use, etc. The data given is the result of actual designing of this character on some of the largest engines built in America and Europe and will be found of advantage to the designer working on engines of this character.

SCARBOROUGH'S ROAD MAP AND MOTOR GUIDE OF MINNESOTA. Published for and under the auspices of the Minnesota Automobile Association. 872 pages, with complete maps. Heavy paper, \$1.00.

More than 550 routes are mapped and outlined in this folder and the automobilist of Minnesota, Iowa, Wisconsin or Missouri should consider one of these route books as part of his necessary equipment if he intends to do any extensive touring about his home or neighboring states.

THE GASOLINE AUTOMOBILE. By Victor Lougheed, member S. A. E., and Morris A. Hall, member American Society of Mechanical Engineers. Published by the American School of Correspondence, Chicago, Ill. 307 6 1-2 by 9 1-2-inch pages, with numerous halftone and zinc engravings. Cloth, \$2.50.

Divided into three distinct parts this book forms a complete text or reference book for the study of the modern automobile. As distinguished from the standard work on gas engines it includes a section which is devoted to the explanation of the different types of bodies found on the modern car while the garage question is also thoroughly analyzed both from the standpoint of the public and the private garage. The authors have made a successful attempt to get away from the stereotyped form of automobile book illustrations. Actual sketches and reproductions made from photographs of cars in actual use at the present day are used in place of the oftentimes impossible pen-and-ink sketch. Among the interesting and valuable chapters are those devoted to the driving and the repair of the pleasure automobile.

DAS AUTOMOBIL, SEIN BAU UND SEIN BETRIEB—A handbook for automobile owners by Diploma-Engineer Freiherr von Löw. Second revised edition, 1912, with 363 illustrations. Published by C. W. Kreidel Publishing Co., Wiesbaden, Germany. Price 6 Mark (\$1.50).

For those who read German this book is of especial value because the author does not only understand his subject practically and theoretically, but also possesses the gift of picking out the essentials and presenting them in plain and lucid language. He knows all the steps in the evolution of automobile design and the reasons for the changes which have taken place from time to time. The style is very brief and meaty, and even readers well versed in the subject will not fail to find valuable sidelights when looking up matters of special interest to themselves. The illustrations are specially drawn and very clear, each of them serving a definite purpose in the presentation of a fact or an idea. A book of similar qualities in English would be of unusual merit as an aid to teachers in the automobile schools.

FARM GAS ENGINES. By H. R. Brate. Published by The Gas Engine Publishing Company, Cincinnati, Ohio. 195 5 by 7-inch pages, with line cut illustrations. Cloth, \$1.00.

There are some excellent points on the carburetion and ignition of gas engines in this work which apply not only to farm engines but to any piece of motor driven apparatus. The remarks on the carburetion of kerosene are especially timely in view of the world-wide protest against the rise in the price of the more volatile petroleum products. In fact the title of this work is far narrower in scope than are the contents and it can be perused with great interest by any one interested in gasoline engines.

elasticity of the rubber is greatly reduced by the cold, cuts and subsequent blowouts would be of frequent occurrence.

I have tried various non-skidding devices but have found that chains are the only satisfactory arrangements to prevent slipping on muddy roads or roads covered with snow and ice. Steel studs in casings themselves, or in protective coverings, soon wear down and then become worse than useless. Even when new, the space between the studs becomes filled with snow which melts under the pressure of the wheel and then freezes, producing a slippery coating of ice on the tire which is very dangerous. In slimy mud, this sort of non-skid device is useless.

If one drives his automobile with care, serious skidding need never occur under any conditions; but I have found that in order to produce the necessary traction between the rear wheels and the road, it is imperative to use a non-skid device, and, as above stated, chains are the only satisfactory solution of the problem. If the chains are put on the wheels loosely enough to creep, the extra wear on the tires caused by them is inappreciable.



Drive Pinion Should Mesh Correctly; Fibre Disks Have Long Life; Causes of Transmission Trouble; Ether Costs Too Much for General Use; Cost of Laying Up Car; Use of Anti-Freezing Solutions; Ordering a Definite Spiral Spring

Drive Pinion Meshes Improperly

EDITOR THE AUTOMOBILE:—I am having trouble with noisy differential bevel gears. I have adjusted the small pinion forward but it only prevents gears from humming for a short time. I removed axle housing and found that gears were apparently in perfect condition. Ball bearings on differential are adjustable in either direction. I have been told by good authority to move differential to one side, bringing gears a trifle out of mesh, while another equally good authority tells me to put them into mesh still deeper.

Any advice that you can give me will be appreciated.
Plymouth, Mich.

SUBSCRIBER.

—If the gears are in good condition and have not worn away a simple adjustment will cure the noise of which you complain. As may be seen in Fig. 2, there are three ways in which the pinion can mesh with the large differential gear. It can be too far forward or back and it can be in correct mesh. It is evident that the direction in which the pinion is too be moved depends on how it is now in mesh with the large bevel wheel. Should the pinion be too deeply engaged move it back, and vice-versa. You will also find an adjustment on the large wheel which will enable you to move it more closely toward the pinion. When the proper mesh is secured there will be practically no noise so long as the parts are kept lubricated with grease or non-fluid oil.

Fiber Disks Will Stand Wear

EDITOR THE AUTOMOBILE:—I have a 1908 50-horsepower Rainier which I want to overhaul during the cold weather. As means of quieting valve stem taps I thought of cutting out the screw bolts that lift valve and filling in with fiber when operating fiber would strike valve stem instead of steel. How long would fiber last after first adjustment? If it would stand the tapping or lifting up on valve for 2,000 miles and then need adjustment, I would not object to adjusting the screw bolts then, but if it did not last long it would not be worth while.

2. What can be done to quiet noisy timing gears? Mine are oiled from oiler, three pipes leading to top of timing gears and the oil dropping on them lubricates. Would grease, if used, run into motor through front bearing and cause gumming up of motor?

New York City.

GEORGE RUDY.

—1. These fiber disks are used on many cars and the adjustments are not required more frequently than with the metal-to-metal contact, while there is undoubtedly a marked diminution in the amount of noise. They will run 25,000 miles before requiring renewal and will not require adjustment more than every 2,000 miles.

2. The only thing that will quiet noisy timing gears is packing them in grease. This has the drawback that you state; namely, the grease is apt to work its way through into the crankcase of the motor and as a result will gum the latter up in a short time. When timing gears become very noisy it is a sign of wear and a new gear should be inserted.

Transmission Trouble Causes

EDITOR THE AUTOMOBILE:—I am driving a certain car in which the second gear became worn out after very slight service. A friend has an old model of the same make in which he has transmission trouble frequently. We are wondering if part of this is not owing to the placing of transmission and differential on back axle with inadequate support. Is it not better practice to place transmission further forward on the frame?

Odel, Neb.

CHAS. N. HINDS.

—There are so many good cars which have not the slightest trouble that have the gearset mounted in conjunction with the rear axle that it can hardly be stated that this system is not so good as that in which the gearset is mounted amidships. Where the bracing is insufficient, however, to prevent changes in the alignment of the gears the trouble you mention is sure to materialize. In the models of the last few years in all the cars which are mounting the gearset aft of the propeller shaft, there has been a tendency toward stiffening the structure at the rear end of the frame. It is not likely that transmission has suffered because it has been placed near the rear axle, but because the material was softer than it should have been.

Ether As an Aid to Combustion

EDITOR THE AUTOMOBILE:—The quality of gasoline that I am using is very poor. Ether has been recommended to increase power. Will you kindly inform me through THE AUTOMOBILE the quantity of ether to use to gallon of gasoline?

Sacketts Harbor, N. Y.

L. W. DAY.

—It would be highly impractical to attempt to use ether continuously to offset the bad effects of poor gasoline. There are many physicians who make a practice of priming with ten drops of anaesthetic through each priming cup in very cold weather after the car has been standing. Last winter a certain physician made some experiments in the line of adding ether to the gasoline in the tank and came to the conclusion that he got better results when he added about 1-2 ounce of ether to each 10 gallons of gasoline. Anaesthetic ether is expensive, and hence it is impractical for the motorist to use it continuously. Commercial ether contains a certain percentage of water which would more than likely render it unfit for use in the motor cylinder.

Average Cost of Repairs

EDITOR THE AUTOMOBILE:—Would you please let me have some information on the following: What is the probable cost of overhauling a four-cylinder motor car? What is a reasonable amount to pay for a set of valves ground; also for timing valves and magneto?

Newark, N. J.

A CAR OWNER.

—Overhauling the motor will, of course, include the valve timing, etc., and the cost of this will to a large degree vary with the repairs which are necessary. Many people let their motor go without a general overhauling until it gets in such a condition that it cannot work satisfactorily, while others who are

wiser either have this work done or do it themselves once every year if the car is run all year round or once every two seasons if the car is laid up in the winter. Assuming the average case where the motor is overhauled every other year, the cost for the average type of 30-horsepower four-cylinder motor would be about \$50, figuring on an average of 66 hours work at a labor charge of 75 cents an hour. If any extra parts are needed this would, of course, be extra and should the bearings be badly worn the time would be longer. To grind the valve and time them and the magneto, would be the work of one day of 10 hours, the cost would be \$7.50 ordinarily. In some of the more inaccessible motors the cost would run above this, while in others it would run below. This is about the average charge to be expected.

Denatured Alcohol Evaporates

Editor THE AUTOMOBILE:—Since the use of anti-freezing radiator solutions is now necessary, I would like a little information concerning the use of denatured alcohol for this purpose. I have filled by Overland cooling system with half alcohol and half water, which I understand is safe for temperatures down to

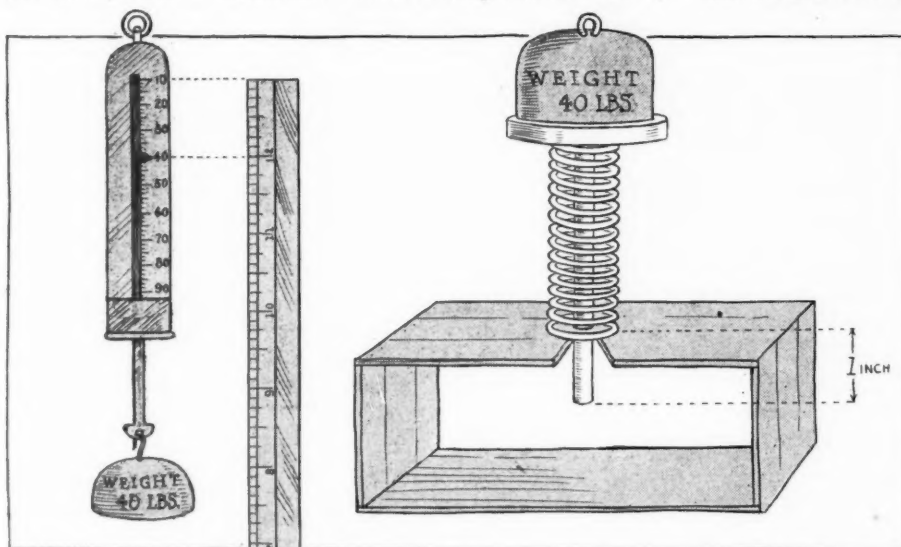


Fig. 1—A 40-pound-to-the-inch spring will compress 1 inch under a 40-pound weight

minus 25 degrees Fahrenheit, but since alcohol evaporates faster than water, the question is, will I always have half alcohol and half water in the cooling system, provided I use the same solution in replacing that which evaporates, or will such a large portion of the alcohol evaporate that my solution will eventually become nearly all water and thus be unsafe as an anti-freezing liquid?

2. How can I tell what proportion of alcohol and what of water I have in the cooling system?

3. Some time ago one of your correspondents asked some pertinent questions regarding five-cylinder, four-cycle motors with cranks set 72 degrees apart. THE AUTOMOBILE replied that information regarding such an engine was rather scanty and asked its subscribers for a discussion of the subject, but as yet I have not noticed any article throwing light on the matter. I for one would like to know just why such a motor could not be built to operate successfully. The explosions in a five-cylinder motor would overlap each other so as to produce a continuous torque the same as in a six, and since five cylinders would weigh less and require a shorter crankshaft and shorter hood with less complication generally, I fail to understand why such an engine is not manufactured and used instead of the heavy, long,

complicated and expensive six-cylinder motors so much in vogue at the present time. I would be pleased to have the opinion of some gas engine designer regarding the above.

East Canaan, Conn.

D. C. CANFIELD.

—1. On pages 839 and 840 of the issue of THE AUTOMOBILE for October 24 there is a full discussion of all the non-freezing solutions, which includes an answer to questions 1 and 2. It may be stated, however, that the evaporation will occur and that the condition of the solution in the radiator may be determined by the specific gravity. The specific gravity of the correct solution is noted and the mixture is kept at this specific gravity by the addition of more denatured alcohol every time a marked evaporation is detected. The specific gravity is determined by a hydrometer.

2. This question is answered under above reply.

3. No discussion has developed on the five-cylinder motor for the probable reason that it has not been tried to such an extent that any one knows anything concrete about it. THE AUTOMOBILE, in the issue of September 12, published the opinion of Mr. Herman Dock on this subject. Mr. Dock at one time was manufacturer of such a motor and his views may be taken with

full confidence by the investigator and at the same time with the feeling that they are given by one who is an authority on the subject. He said, in part: "I believe the only reason why this type of motor is not being built is because its merits have not been investigated, for, in my judgment, which the performance of a motor of this type will bear out, there is nothing in the line that will equal them unless it be a seven cylinder.

"In one or two instances wherein I tried to interest automobile manufacturers in this engine I was met with the argument 'that the public were satisfied with the four or six, therefore, why the use of improving?'

"In a five-cylinder engine there is nothing to invent, but I did, I believe, build the first one of its class in Philadelphia in 1901. Since then in connection with the concern which had the contract I built the government field search-

light engine and others and wherever they have been put in commission they give satisfaction.

"For automobile use they are much superior to the four or six as the shaft is in constant torque, one cylinder being always in pressure, and the machines in which I have ridden with the five cylinders are the best hill-climbers of any.

"As to balancing, this class of engines was a surprise, for while I was building the first one many interested engineers saw it and the general opinion of all was that it would be so out of balance as to be worthless.

"But, as a matter of fact, it is the quietest, smoothest engine I have found and more flexible by far than its four- or six-cylinder brother.

"Finally it is my belief that whenever some enterprising manu-

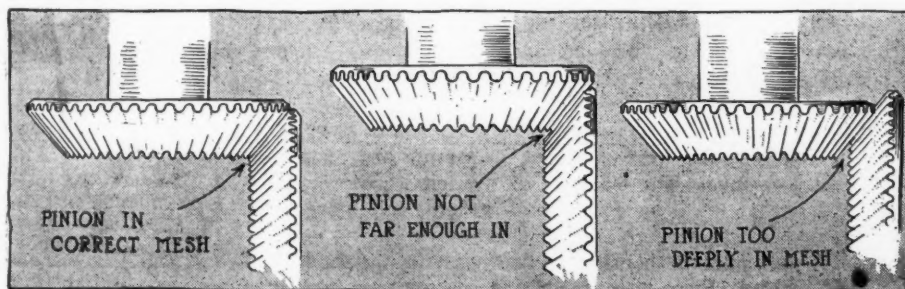


Fig. 2—Diagram showing how pinion can be too deeply or not deeply enough in mesh

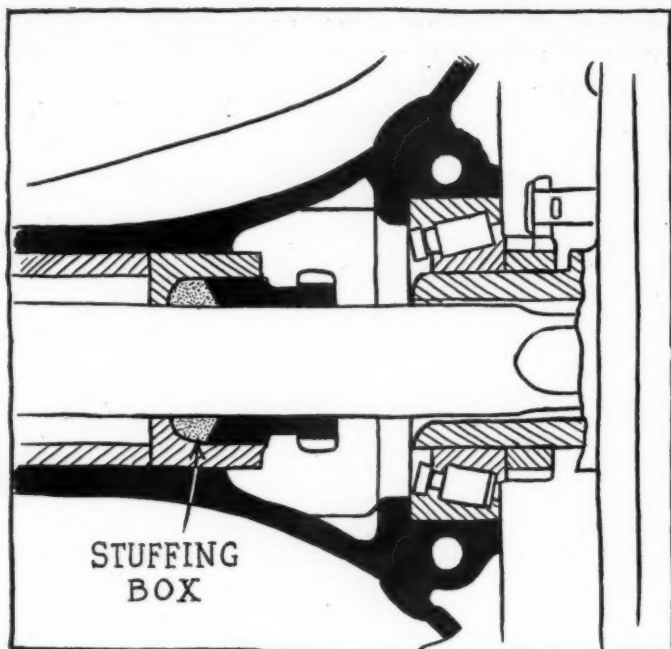


Fig. 3—Installation of felt or hemp packing box at inner end of drive axle

facturer of automobiles take up the five cylinder he will have a walkover and command the field, given that his production is always first class."

This is an interesting topic and one which could be further discussed to advantage. There is a lack of data as regards actual performance on the road and Mr. Dock does not state what cars were ever manufactured that used this motor. THE AUTOMOBILE has no record of any such.

How to Order Spiral Spring

Editor THE AUTOMOBILE:—I desire to order a spring that will compress 1-inch under a 40-pound weight. What must I tell the spring maker? Is a 40-pound spring one that will compress or extend 1 inch under a load of 40 pounds? I have asked several people regarding this and they all seem to disagree on the subject.

Saratoga Springs, N. Y.

C. J. WILKINS.

—There is more or less confusion as to what a 40-pound spring would be. That is, whether it would be a spring which had a total capacity of 40 pounds or whether it would compress 40-pounds to the inch. The particulars necessary in ordering the latter would be the diameter of the spring, the length when under no load, the length under a given load and a brief description of the purpose for which the spring is intended.

Keeping Oil from Brake Drums

Editor THE AUTOMOBILE:—In THE AUTOMOBILE for October 10, page 734, you say a thick wadding of felt is placed around the drive axle and acts in the nature of a stuffing box. Would you please tell me as definitely as possible about this. How thick should the felt be? What shape and size are the pieces of felt? What tools are used to put it in with? Is the entire space from bearing to bearing filled up, and how much? How long should it last in miles run? How do you get it out when it becomes worn?

Mongaup, N. Y.

GEO. S. BELDING.

—The felt is in the form of a ring or washer and about 1-2 inch thick as a rule. The diameter of the felt washer depends upon the size of the drive axle. As a general rule more than one of the felt washers are used to close up the space between the drive axle and the housing at one point in the length of the axle. Should there be no provision in your car for these washers it would be suggested to secure four felt rings for each

side. The hole through the center of the washer should be ordered 1-16-inch in diameter less than the size of the drive axle, as it is easy to stretch them over the axle and get a tight fit. The outside diameter of the washer should be a trifle greater, say 1-4 inch, than the inside diameter of the axle housing at the point at which it is desired to place the washers. In a floating axle the felt washers would be slipped over the drive axle close together from the differential end and then worked into place by the most convenient means possible. It is impossible to state what sort of a tool would be best without seeing the car and noting the conditions. The entire space from bearing to bearing is not filled. Only 2 or 3 inches is necessary if the felt is a tight fit. The washers should last for at least two seasons' use. It can be removed by taking out the drive axle and poking it out. Almost every car in existence has some means of checking the flow of oil from the differential housing to the brakes and a few of these are shown in Figs. 3, 4 and 5 with an idea of illustrating what makers do to prevent the slipping of the brakes from the gathering of oil on the lining of the shoes.

From these illustrations it will be seen that in most cases the interior of the axle housing has been designed to take the felt washers and hold them in place. A stuffing box is employed by some while the spring shown in Fig. 5, is used by others. Felt washers may be jammed into the space between the axle and the housing, however, should there be no such provision for their installation.

Street Gamins Bother Motorists

Editor THE AUTOMOBILE:—There is a law which requires that cattle must be kept off our public highways, yet there is no law in regard to children being kept from playing in the middle of the streets.

The one great argument always used is that children in the big cities have no other place to play. It is the children in the country that cause more than one-half the trouble. There can be no doubt at all that they have more than sufficient room to run and jump to their heart's content without endangering the lives of motorists as well as their own lives by darting out into the road at any old time regardless of what is coming.

If it were only the young one's carelessness that caused accidents we might be more lenient with them. Children can hardly be supposed to understand the real dangers to be apprehended from automobiles. Very often, in this supposedly educated coun-

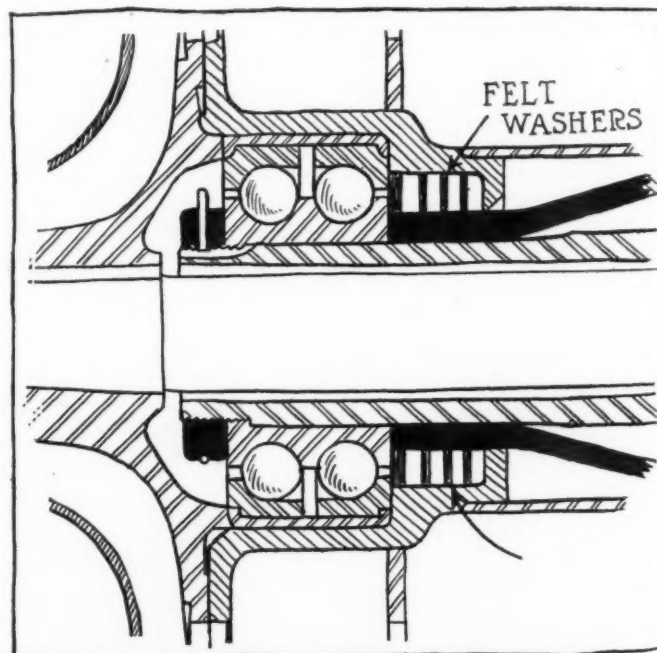


Fig. 4—Some makers put felt packing at the wheel end of the axle to exclude the oil

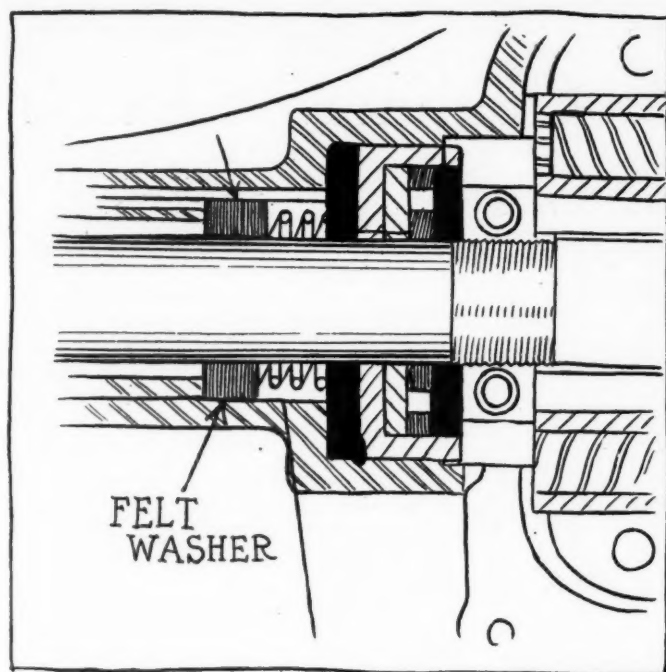


Fig. 5—Easy installation of most cars. Felt washers used with spring

try of ours, children throw dirt and rocks at approaching cars. Either a driver must pass through a country settlement at such speed as to prevent damage to his car by pure devilry on the part of little children in the street and risk hitting one of them, or else he must drive slowly with a tolerably sure knowledge that he will get a rock thrown at his car or a handful of dirt in his face.

Two weeks ago I was driving my car along a country road in the Berkshire Hills. I was going at a speed of 14 miles per hour and climbing a small hill. Several children saw my machine approaching and ran to the side of the road. I slowed up and passed them, barely moving. One can never tell just what a kid is going to do! As the machine reached a point directly beside the children, one of the smallest ones picked up a handful of sand and pebbles and with a well-directed throw completely blinded me. I held my machine in the center of the road and stopped instantly, but not before one of the other children had darted in front of my mud guard. When I cleared my eyes of dirt the child was lying in the road behind the machine. I gave my number, offered to call a doctor or take the injured one to the Hospital and be of service in any way possible.

Six or eight people witnessed the accident and they all agreed that I was in no way to blame. This did not prevent the police from arresting me and holding me under \$2,000 bail. After 2 weeks' fight put up by the best lawyer money could secure I was cleared. It cost me several hundred dollars and caused me great inconvenience. I had to appear three different times in the country court, 5 or 6 hours by the railroad from New York. Everyone would have been thoroughly shocked had I suggested suing the mother and father of the 3-year-old child who was to blame. The youngster I hit was up and about in 3 days. This is the justice of some of our automobile laws in this glorious free country.

It is hardly possible that the government can control children directly or make them see the danger of playing in the street. It is also hardly possible that the same government can keep the children from becoming a menace to motoring. In fact, they are that already. But cannot the parents of these children teach them the right and wrong in regard to their actions in the street? What mother would see her offspring deliberately break an electric lamp without reprimanding him? What mother would stand by and let her child steal apples from a street vender? Yet par-

ents feel no responsibility at all in regard to automobiles.

The animosity shown toward motor vehicles some years ago was pardonable. The same feeling today is ridiculous—and unpardonable. True, there are many who drive cars that care very little for the rights of those living along the road, but the percentage of careful drivers has doubled itself. The percentage of automobile haters has not cut itself in two.

A short time ago a young child; perhaps 4 or 5 years old; threw a rock the size of an egg at me. It missed my head and dented in the car door, entirely ruining the enamel. Then the offender ran into his house, conveniently near and left me to pay all the damages as usual. If that rock had hit me it would have been all over except the funeral expenses. As it was, it only took \$25 out of my pocketbook.

Let the parents of American children wake up! Do you want your youngsters to become known to the automobile world as pests? Do you wish every driver to put on full speed the instant he sights a child? Which is the most dangerous, cars passing your house at the rate of speed far exceeding the limit to avoid your children or 15 miles an hour with the assurance to the motorist that he will not be annoyed. The common people of this country must decide and they must decide now.

New York City.

EUGENE JONES.

Wiring Diagram for Mea Magneto

Editor THE AUTOMOBILE:—Will THE AUTOMOBILE kindly tell me how to wire up my Mea magneto for a four-cylinder car? Is it necessary to have a separate coil?

Wichita, Kan.

C. SQUIRES.

—Assuming that you want the cylinders to fire 1-4-3-2 the wires would be connected up in the manner shown in Fig. 6. Should it be desired to fire according to any other order all that is necessary is to change the wires leading to the plugs. For instance in firing 1-3-4-2, all that would be required would be to interchange the wires leading to spark-plugs Nos. 3 and 4. No extra coil is required with this magneto as there are both primary and secondary windings on the armature. The low-tension winding ordinarily is short-circuited by a breaker which opens at certain points of each revolution with the result that a high voltage is generated across the high tension winding at the moment of the break, and a spark is produced across the spark gap in the cylinder to which it is connected. In the diagram the primary current is generated in the coarse winding P and serves to induce a current in the secondary winding B which passes through the connector ring and a brush supported by the brush holder G. The high tension lead C communicates between this brush holder G and the revolving segment of the high tension distributor H. The ground connection of the spark-plugs I is represented by the dashed lines A. The primary circuit is represented by the line B, which shows communication between the circuit breaker E and the armature. The condenser is represented at F.

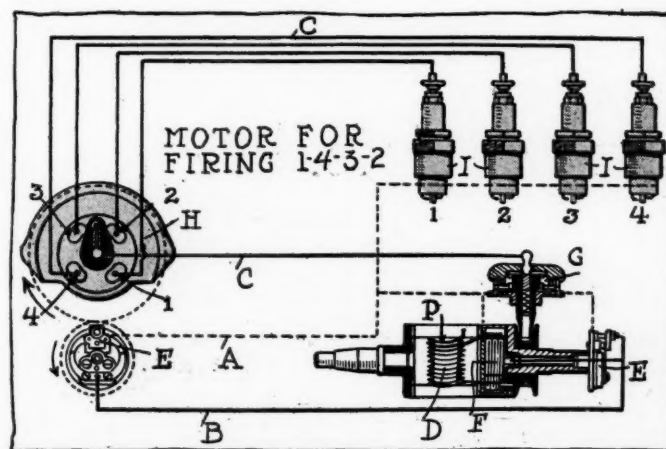


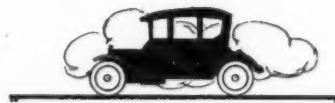
Fig. 6—Wiring diagram for use with a Mea magneto of four-cylinder car.

Coupé Design for 1912 Chalmers Chassis



Scale Drawings and Details of Light Four-Passenger Body for Winter Travel

By George G. Mercer



OF the Chalmers models, a 30 touring car chassis has been selected on which to show the third of the closed-body designs. This chassis is a 1912 Chalmers 30 with 115-inch wheelbase and 34 by 4-inch tires. The stock chassis that has been in service during the season should give a good account of itself with the body design here illustrated, as the power, tires and springs are sufficient to take care of this 750-pound body.

The chassis changes required are new rear fenders and gasoline tank, the location of this latter changed from under front seat to the compartment at the rear, Fig. 5. In this position the tank shows a filling plug projecting above the cover of the compartment and it will be necessary to use pressure feed. The old tank can be made to do service either by adding the filling plug, as specified, or by having the cover of the compartment made to raise for filling. This will save on the expense. Another item that will reduce cost is to make use of the stock rear fenders that are used on the runabout, as these are the same shape as those illustrated. No other change is required to the chassis, the locations of the levers, change and brake are right for the closed body and the electric dash lights will be entered as part of the body equipment.

The makers of this car also furnish a model 30 with 104-inch wheelbase and the stock bodies are a runabout and small coupé, generally called a physician's coupé. The object in choosing the 115-inch wheelbase chassis is to furnish a design that does not conflict with the stock body and that is large enough and yet light enough to be used to replace the touring body in the winter

season, and in addition it may be said that this design is equally applicable for use on the model 36 and will fit the chassis of either the 30 or the 36-horsepower cars.

The science of getting the article most applicable for one's needs is to examine exhaustively a number of samples, then, after eliminating, make the final selection from the remaining few. Body designs are chosen by the same method and as no one design is all merit or demerit, the final choice is often a combination of the essentials of a number. The design here reproduced is in no sense a substitute for the stock body design, but is one having totally different features; it is intended as the complement to the five-passenger touring body and to alternate with this latter for service during the winter months.

The illustrations show a four-passenger body with the seating arrangements for two on the front seat and two on the rear seat, all facing forward. This design has a true flush-sided effect. The lower side panels at the front are graduated to the dash and blend into the cowl, which is well rounded, Fig. 5. The rear side panels are formed in one piece with the back panel and the rear corner is rounded, Fig. 2. The roof is arched and the corners rounded over. The compartment at the rear is made just large enough to contain the gasoline tank, the size of which is indicated, Fig. 5, and under the rear seat is a lock 7 inches high, 20 inches deep and 40 inches wide.

Inclosed body designs of the coupé type have a fault that has been difficult to overcome, namely, the access to the seats. In some cases the entrance on the right side is entirely blocked by

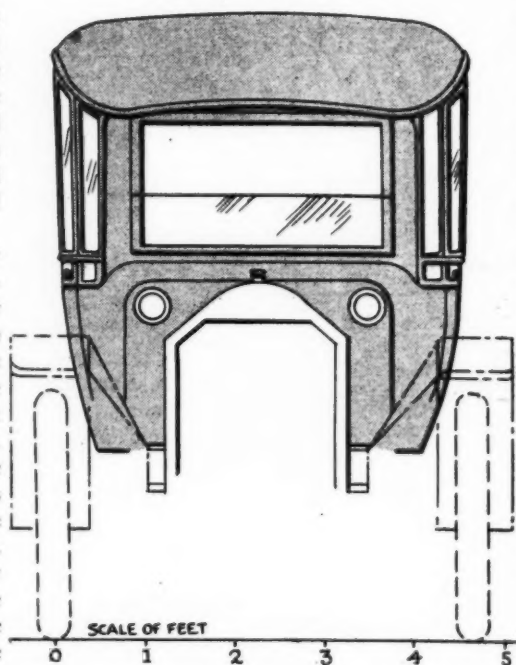


Fig. 1—Front view of Chalmers 30 coupé design

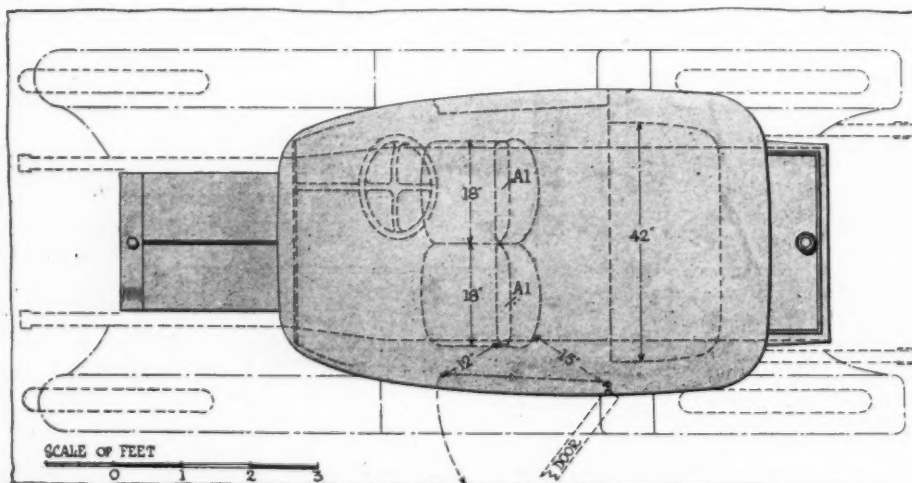


Fig. 2—View from above of suggested Chalmers coupé

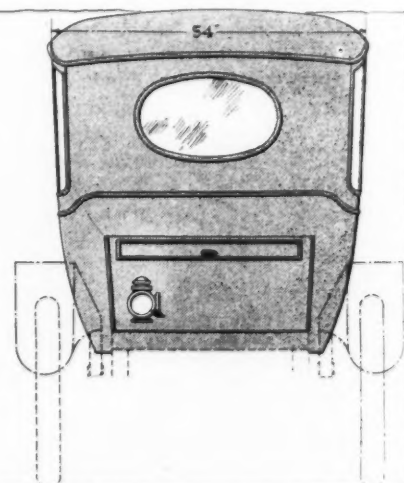


Fig. 3—Rear view of coupé

the levers, and if the body is of the four-passenger type similar to this one, the difficulties are greater than with the two-passenger body. The location of the steering wheel back of the dash only enters into the calculations on a very short wheelbase chassis.

One solution of this difficulty is the offset doors. This was illustrated in the coupé design published in *THE AUTOMOBILE* October 31, 1912, and another solution is that presented in this design. Fig. 5 shows a door 30 inches wide over the mouldings with the seats indicated in dotted lines.

The front seat is made individual and the cushion part is made to tip up. A, Fig. 5, shows the cushion elevated. On Fig. 2 the top view of the cushion is indicated by A1 and the open position of the left door shown by dotted lines. The entrance to front and back seats is marked. To the rear the passage is approximately 15 inches and to the front approximately 12 inches is obtained between the body framing and the bottom of the raised seat. The individual front seat cushions are each 18 inches wide. The rear part of these seats and the backs are built solid to the lower framework of the body, the cushion part is hinged and when dropped to the horizontal is supported by a solid top at the back end, no partition or framework being used under the front of the seat as this would interfere with easy entrance. The rear seat cushion is comfortable both in depth and width for two people and the thickness of the cushion which is 10 inches will insure the maximum of comfort. Ample foot room is allowed by the partial open space under the front seat. The head room over the seat is the maximum for a coupé body.

The general dimensions of the body while affording ample room inside are well within the allowance that will insure a compact and light-weight body. The extreme width is 54 inches over all and the length from front to back of the body is 76 inches.

The windows on the sides of the body are approximately the same width back and front of the doors, these latter being

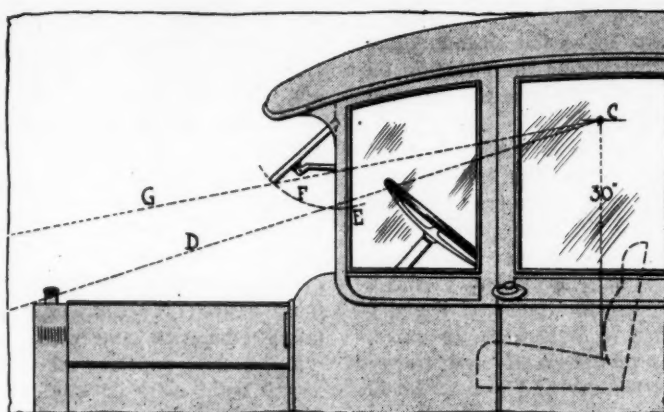


Fig. 4—Diagram showing method of determining the correct position of windshield and swing-visor

placed about central in the body to carry out this harmonious effect. All windows on the sides and back are made with the frameless glass; the back window is stationary and those on the sides all drop the full length. The front windshield is made with the customary rain visor division, with the part below the cut stationary and that above it hinged at the top and made to swing outward. The supporting rods in the forward position are short arms that slide on perpendicular rods inside the front pillars. The roof extends forward of the

pillars 8 inches, Fig. 5, and serves as a partial protection from the down beat of rain and snow. It assists in keeping the glass clean.

Carriers for extra tires are not illustrated as it is not practical to put them on the running board, on account of the very wide door, but provision can be made for them at the rear of the gasoline compartment. It will be necessary to carry the tires in a nearly perpendicular position.

Fig. 4, a section of the front of the body, shows the seat, front windshield and the top of the engine hood. Its purpose is to illustrate a suggestion for determining the proper height up for the cut in the windshield glass, so that when the swing part is forward as a visor the opening is right for the driver to see through. If the cut is too low, the swing part is proportionately longer and the opening will in turn be greater, thereby allowing more cold air and rain to enter.

The point C is located in a perpendicular line from the back of the seat, at a height of 30 inches. This is the height of vision of the average man and is a rule applied by trimmers and top makers. From C a line is carried to the top of the hood at the front and is marked D. The point where line D passes through the glass E is the line of cut through the glass and will be the lower line of the swinging section.

Line D is the line of vision of the average person, seated in

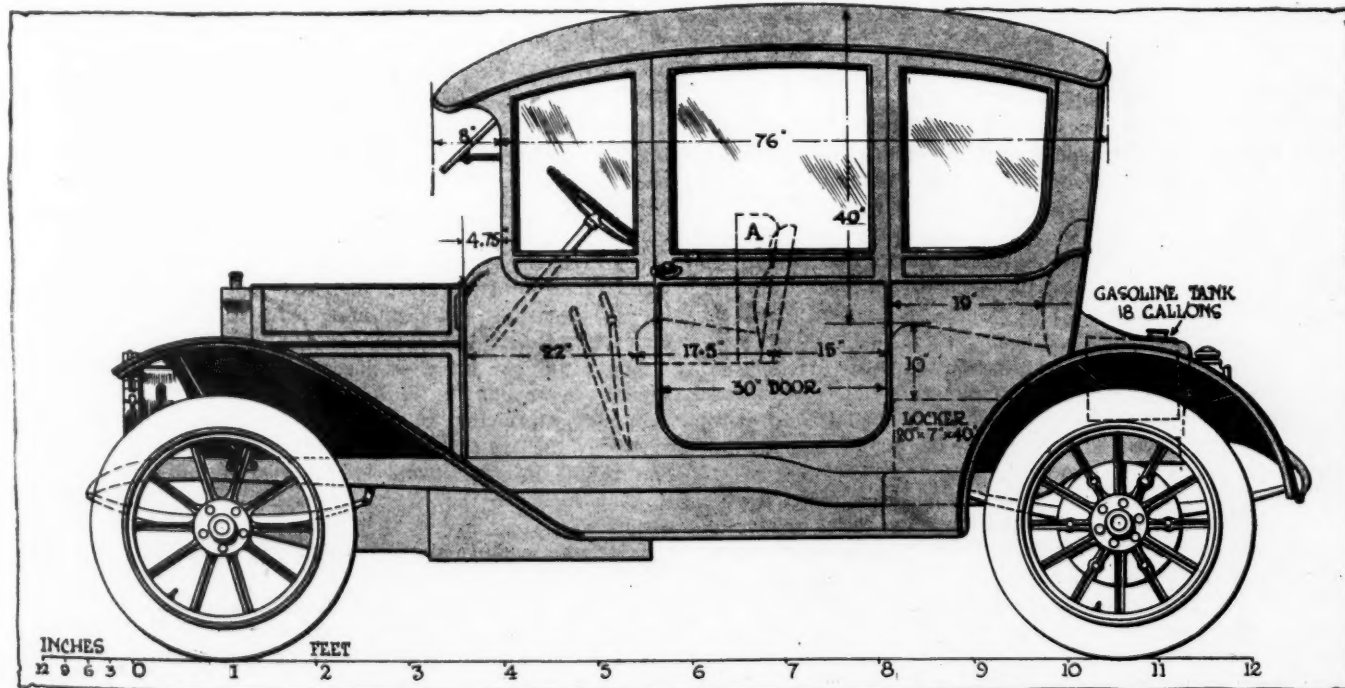


Fig. 5—Side view to scale of suggested coupé design for Chalmers 30 chassis

position to drive the car and allows free sight over the front of the radiator. It can be readily seen that if the location of the cut E is made without the proper calculation the swinging section will be either longer or shorter than will give the maximum of vision with the minimum of opening.

In other words, if, for example, the line E was made 1 inch lower than the line of travel of the swinging section would have a radius 1 inch greater than F and the intersecting point with line G would be further toward the front; consequently the actual open space to obtain the range of vision between the lines D and G will be greater by 1 inch lower than E and by 1 inch further forward than the intersecting point of F and G.

This example shows how important it is to have the correct line of cut that will suit the position of the driving seat, and the rule illustrated is as simple as any in use and can be readily applied by any person.

The construction of the body is aluminum 16-gauge panels with aluminum mouldings and the framing is of good quality ash. The heavy mouldings on the door pillars and those back and front of the door and the front pillar are made of wood and are worked solid on the framework. The rear compartment is made of aluminum panels and wood framing and the lid at the top lifts off when the filling cap of the gasoline tank is removed.

The roof is rounded over on the edges more than ordinarily and is made with the customary laminated wood roof panel, which is glued on the top edge of the side and end top rails, and when set the rounded edge is formed by planing the roof rail and the panel edge sufficiently to get the shape. The top canvas is drawn over the roof and the edges fastened under the drip moulding that extends all round. The bows inside to support the arch are placed 7.5 inches apart. This construction is sensible and any bodybuilder will guarantee his work made according to this specification.

This style of roof is in harmony with the general body design illustrated, and, moreover, it is a design of roof that is meeting with favor when used in connection with a body design having all the exterior lines rounded.

The style, applicableness of the design for the make of chassis

and use for which it is intended, as well as the type of construction, have been detailed in a general way, and also the special features, that is, the extra width of the door opening to the seats and the proper method of determining the cut in the front windshield, have been outlined sufficiently. It now remains to consider the finishing up of the job and the cost.

The finishing up of the body, that is, the nice attention to details and making sure that the job is really complete, is a matter that only the reliability of the firm doing the work is a guarantee for. No specifications can insure thoroughness on the part of the mechanic. The best practice, if cheapness is not the one thing desired, is to buy reliability from a firm with an established reputation, and when making the contract, select from samples, cloth and lace for trimming the seats, doors and sides of the body, cloth or satin for lining the roof, carpet for the floor and silk for the curtains. The toilet cases can be selected from samples and will vary according to price; there should be at least one complete toilet case and one card case and one ash or cigar tray to be put on the doors. Corded hat racks are useful and pockets of ample proportions can be placed one on each side at the front of the door opening and two small pockets can be placed at the rear of the front seat back; this will be useful for those seated at the rear. The interior woodwork is walnut to conform to the finish of the dash and two electric dash lamps are placed in the dash with only the rim and the glass projecting. This is illustrated in Figs. 1 and 5. The current for lighting these lamps will also be used for the dome light in the roof.

The listed color specifications for Chalmers closed bodies, 1912, are upper body panels black, lower body panels either Chalmers blue or Brewster green, and chassis, including wheels and hood, black, and these colors are applicable for the design submitted. The trimming will conform in color to the body color selected.

The cost of a special made body of the design illustrated, finish and appointments to be equal to the stock limousine body, will be approximately \$1,300 to the retail trade. This is a fair average price and it can be increased or reduced according to the will of the customer, who may want more or less than specified.

Practical Application of Autogenous Welding to Aluminum

From a Paper Read by Dr. F. Carnavali Before the Institute of Metals, London, Eng., Continued from Last Week.

THE experiments on this group were carried out with two types of metal, one designated by the letter S (see Table V), consisting of pure aluminium containing 99 per cent. of the metal in the form of rods of two different diameters (30 and 12 millimetres respectively) and of flat bars, 6 millimetres thick; the other sample used during the test was in the form of rods, 15 millimetres in diameter, consisting of aluminium alloyed with 3 per cent. of copper (a type of alloy in common use industrially). The welding material consisted of thin rods of metal of identical composition with both types respectively. The experiments were conducted under precisely the same conditions as those of the previous series, special care being taken to avoid oxidation, to which the metal is so easily liable during the process of welding. For this purpose appropriate deoxidising powders were used.

Micrographic study of the several samples, pursued by the same method as that followed in the foregoing series of investigations, enabled one to identify without difficulty the welding zone by its coarsely granular structure. This structure is a consequence of the high temperature attained by the metal in fusion. In the case of a sample 8 millimeters in diameter and 80 millimeters in useful length which was cooled after welding, the weld zone showed thin, dark filaments which are the margins of the big crystals, while within the crystals themselves are seen small,

and exceptionally numerous, dark, rounded inclusions—less abundant in the other samples—formed by the oxide which has remained imprisoned in the metal. In this case oxidation was especially active during the process of fusion. This structure, which repeats itself in the various samples of type S, undergoes modifications varying according to the different treatment to which the metal is subjected. Hammering, for instance, tends to approximate the structure of the weld-zone to the original texture of the metal; while reheating tends to make the texture of the entire weld-zone homogeneous, eliminating the interval strains set up within the metal as a consequence of rapid fusion and similar rapid cooling.

In contradistinction to the phenomena observed in the case of copper, the oxy-acetylene autogenous welding of pure aluminium results in an intimate union between the latter and the welding material, the two substances forming an inseparable corpus.

The data accumulated and the observations made in the course of this series of experiments with the oxy-acetylene autogenous welding of aluminium, show—

1. That sudden heating and rapid fusion of the metal subjected to the welding process alter its physical and mechanical properties in a manner analogous to that observed in the case of copper, though in less degree. They set up within the metal

TABLE IV—SHOCK TESTS MADE ON SAMPLES OF BRASS AND BRONZE WITH THE CHARPY APPARATUS

No. of Sample	Initial Dimensions of Sample	Thermal Treatment	Indicated Angle	Breaking Test Kgr. Mm.	Mean Chemical Analysis		Remarks
					Of the Metal Per Cent.	Of the Welded Zone Per Cent.	
A1	Rods, diameter=40 millimetres.	Rough fusion.	128°	4.646	{ Cu=94.2 } { Sn=5.7 }	.....	Not welded.
A2	Rods, diameter=40 millimetres.	Reheated.	119°	6.698	.....	.....	Not welded.
A3	Rods, diameter=40 millimetres.	{ Cooled in air after } { welding. }	141°	2.112	.....	Cu=94.89	Welded; medium-grained fracture, with small vacuoles.
A4	Rods, diameter=40 millimetres.	Reheated after welding.	132°	3.807	.....	.....	Welded; medium-grained fracture, with vacuoles.
B1	Rods, diameter=40 millimetres.	Reheated.	134°	3.407	{ Cu=87.9 } { Sn=11.01 } { Zn=1.03 }	.....	Not welded.
B2	Rods, diameter=40 millimetres.	Cooled in air after welding.	140°	2.286	.....	{ Cu=90.2 } { Sn=9.01 } { Zn=0.8 }	Welded; finely granular fracture, with numerous vacuoles.
B3	Rods, diameter=40 millimetres.	Reheated after welding.	139°	2.464	.....	.....	Welded; finely granular fracture, with numerous vacuoles.
C1	Rods, diameter=40 millimetres.	Reheated.	136°	3.019	{ Cu=87.1 } { Sn=9.3 } { Pb=3.48 }	Cu=89.7 Pd=2.9	Not welded.
C2	Rods, diameter=40 millimetres.	Cooled in air after welding.	145°	1.457	.....	.....	Welded; finely granular fracture, with numerous vacuoles.
C3	Rods, diameter=40 millimetres.	Reheated after welding.	139°	2.464	.....	.....	Welded; finely granular fracture, with numerous vacuoles.

latent internal strains, and modify its structure detrimentally.

2. That the structural modifications, induced by excessively rapid heating during the process of welding, take the form of coarse crystallization of the metal.

3. That, so long as all the necessary precautions are observed in the process of welding, the changes in the mechanical properties of pure aluminium, such as breaking strain, ductility, hardness of the weld-zone, are not very profound, although a notable increase in brittleness is observable, as is shown by the results of shock tests. The presence of copper, however, modifies profoundly in a detrimental sense the mechanical properties of aluminium.

4. That, in consequence of the feasibility of achieving with pure aluminium a perfect and homogeneous weld of the metal, both mechanical (hammering) and thermal (reheating to 450 degree to 500 degree C.) treatment is extremely efficacious, in that it sets up greater homogeneity in the weld-zone, and eliminates the effect of the excessively rapid heating undergone in process of welding, ameliorating consequently the quality of the metal.

5. That whenever aluminium contains small quantities of other elements easily oxidizable at high temperatures (as for example, copper), the oxidation of the metal in fusion is facilitated, also the inclusion within it of granules of oxide detrimental to the mechanical properties of the weld-zone.

6. That, taking into account the results obtained, as also the foregoing conclusions, we may assert that the oxy-acetylene autogenous welding of aluminium, when carried out with the necessary precautions, is capable of extensive application in practice, especially for the autogenous welding of small parts.

In connection with Table IV it is interesting to note that considerable variations occur in the composition of bronzes and brasses according to the number of constituents of the alloy and in proportion to their affinity for oxygen and to the volatility of the oxides formed therefrom. Thus, in the bronzes of type B, Table IV, in the welded zone, there is an average diminution of 19 per cent. in the proportion of tin; while the loss of zinc, a more easily oxidized metal than tin, amounts to 22.3 per cent. (the original proportion present being smaller than that of tin). In brasses, wherein the percentage of zinc is much higher, its decrease in the welded zone is 28.7 per cent.

Harking Back a Decade

FROM *The Automobile and Motor Review*, November 1, 1902:

The Massachusetts Automobile Club, of Boston, although but a babe in years, has already attained to the proportions and vigor of a full grown organization. It occupies a club house expressly built for it. The club was formed in 1900 and now has a membership of 160. Col. James Taylor Soutter is president. Charles J. Glidden is an enthusiastic member.

The license clerk at Cleveland, O., has announced that 414 automobiles have been registered by him since the new law went into effect last summer.

The Massachusetts State Highway Commission is at present making an inspection of the main highways of the Bay State, using a Locomobile surrey for the purpose. They will visit 350 towns and will traverse the state from end to end. It is expected that a considerable appropriation will be made to improve the roads in the Berkshires.

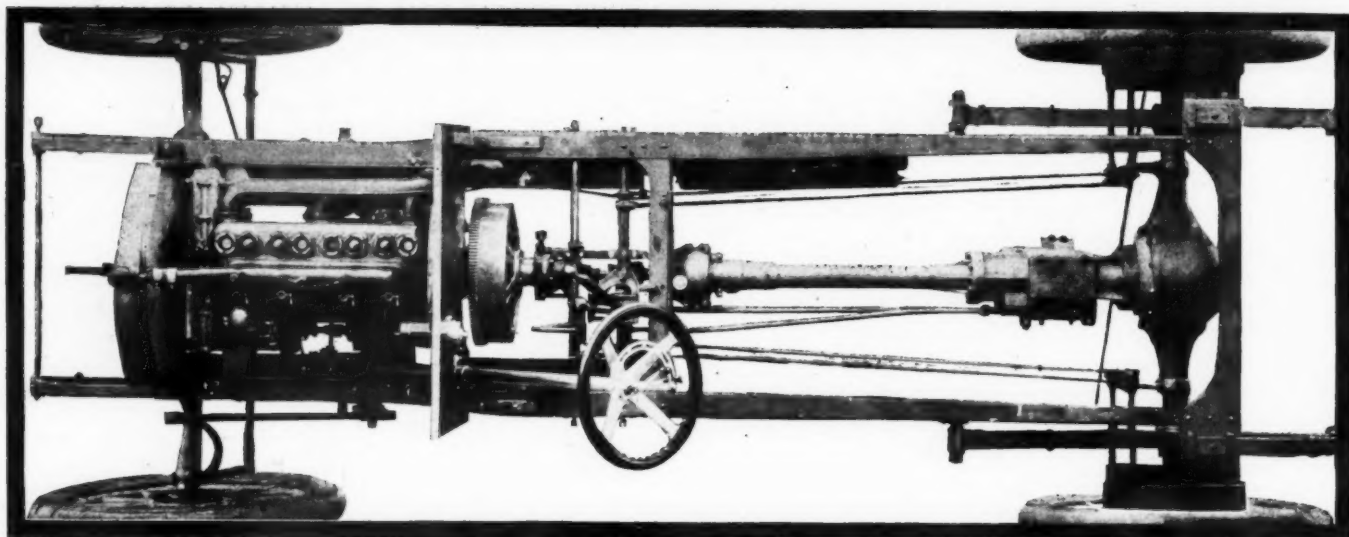
J. A. Seitz, of Syracuse, who recently completed a tour through Ontario, reports that the people in the rural districts were almost as badly frightened by the appearance of his automobile as were the horses.

The plan put forward by the Standard Welding Company, of Cleveland, for standardizing automobile rims as to the number of lug holes and spoke holes is attracting much attention. In the 26 and 28-inch rims, there are five lug holes and in the 30-inch size and larger, the number is eight.

The entry list for the fifth exposition of the automobile at Paris closed October 10. The show will open December 10 and remain in session until Christmas.

TABLE V—SHOCK TESTS WITH THE CHARPY APPARATUS

Number of Sample	Initial Dimensions of Sample.	Thermal and Mechanical Treatment	Indicated Angle	Breaking Test Kgs. Mm.	Brinell Hardness (average), 500 Kgs.	Remarks
S1	Rods, 20 mm. in diameter.	.....	117°	7.181	.....	Not welded.
S2	Rods, 20 mm. in diameter.	Reheated.	110°	8.936	27.2	Not welded.
S3	Rods, 20 mm. in diameter.	Cooled in air after welding.	141°	2.112	.....	Welded; medium grained fracture; small vacuoles.
S4	Rods, 20 mm. in diameter.	Reheated after welding.	119°	6.698	25.9 in the weld.	Same as above, but no vacuoles.
S5	Rods, 20 mm. in diameter.	Hammered and reheated after welding.	128°	4.646	27.2	Same as above, but no vacuoles.



Chassis of the four-cylinder 1913 Lenox, showing position of the gearbox at the rear of the propeller shaft

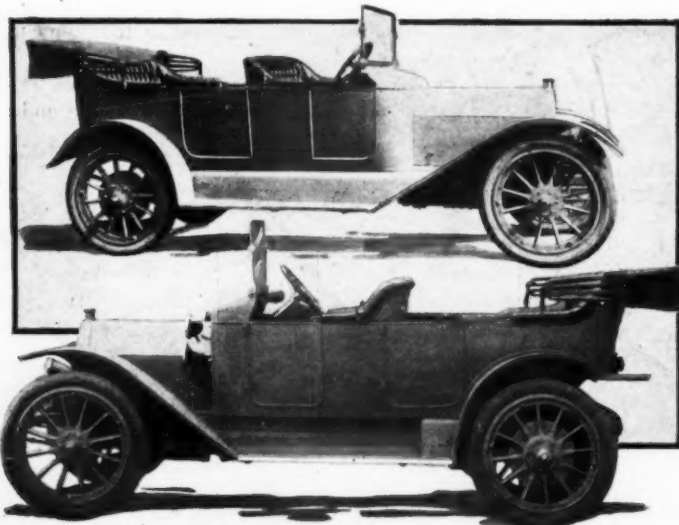
Lenox Adds a Six

Motor Develops 61.5 Horsepower on the Block—Four Cylinder Model Will Be Continued

FOR 1913 the Lenox Motor Car Company, Boston, Mass., offers a new six-cylinder car beside the four-cylinder machine. Aside from the difference in the wheelbase length and in the motors, the two are practically the same in constructional features, although the six-cylinder is made somewhat heavier than the four and the parts whose length depends upon the wheelbase are necessarily different in the two models. The wheelbase of the six-cylinder is 130 inches, while that of the four is 118 inches.

The four-cylinder model is practically the same as for 1912, except that a number of mechanical refinements have been introduced, none of which, however, is radical. The aims in making these changes were simplification of construction, greater accessibility, economy of time and attention of maintenance, and the minimization of running expense.

The four-cylinder motor is of the vertical L-head type with



Upper—Four-cylinder Lenox touring car for 1913
Lower—Six-cylinder—note cowl on both models

the cylinders cast en bloc with the valves at the right side. The S. A. E. rating is 29.8 horsepower, but the engine will develop 45 brake horsepower. The six-cylinder motor is of the T-head type and is larger and more powerful, having a rating of 38.4 by the S. A. E. formula and developing 61.5 horsepower on block tests. It has a bore of 4 inches and a stroke of 5 inches, the exhaust valves being at the left and the intake at the right.

The cylinders are cast of gray iron and 20 per cent. steel with integral waterjackets so designed that the water circulates entirely around each cylinder. The cylinder blocks are open above the combustion chamber heads and this renders complete cleaning of the waterjackets possible and insures perfect flow of the cooling water. The flange base is wide and with side webs forms recesses beneath the valve pockets covered for the protection of the valve mechanism. The cylinder block is machined rough bored, reamed, aged and finished by grinding, this process eliminating all casting strains.

Pistons Carry Oil Grooves

The pistons are carefully turned and ground, being fitted above the wristpins for four compression rings of the diagonal split eccentric type, ground to size on the edges and peripheries. There are two oil grooves at the bottom of each piston.

The upper half of the aluminum alloy engine base casting carries the main and camshaft bearings, and a central transverse web carries the center main bearings, the lower section being divided by a horizontal web containing the oil pools for the splash lubrication. Below this is the oil reservoir.

The crankshaft is a nickel steel drop forging, the crankpins being 2 inches in diameter and the main bearings 2 inches in diameter forward and 2.125 inches diameter at the center and rear. These being respectively 3.625 and 4.5 inches long, give a total of 11.125 inches bearing length.

The bearings are of nickel babbitt in bronze journals. The camshaft is of nickel steel drop forging 1.125 inches in diameter, with integral cams. The camshaft has three bearings, each 2 inches in diameter and 2 inches long. The camshaft bearings are of phosphor bronze. The shafts are hardened, heat-treated and ground to size. The camshaft is forged with a forward flange to which the timing gear is bolted.

The connecting-rods are I-section drop forged heat-treated steel and carry bronze journals lined with nickel babbitt. The large ends of the connecting-rods carry oil scoops. The wristpins are of hardened steel and are secured in the piston bosses by set-screws.

The valves have nickel heads and carbon steel stems and the ports are 2.25 inches in diameter. The valve tappets are of the mushroom type with set-screws and lock-nuts for adjusting for wear. The stems, tappets and springs are inclosed.

Lubrication is by a spring-retained plunger pump driven by an eccentric off the camshaft. This pump forces the oil to the bearings. The camshafts, crankpins, wristpins, valve tappets and the pistons and cylinder walls are lubricated by splash.

The cooling system consists in a centrifugal pump forcing the water up to the waterjackets to the large radiator, which is 2 inches deeper on the four than on the six. Auxilliary cooling means consist in a large belt-driven fan.

Ignition is by a Mea high-tension magneto driven by a flexible coupling to the water-pump shaft.

The carbureter is of the automatic float-feed two-jet type with a long waterjacket and auxiliary valve controlling the high-speed intake. This has a strangling tube which prevents any accumulation of gasoline at the seat of the auxiliary valve and insures against choking of the motor when accelerated after running slow.

A Gray & Davis electric starter, consisting of a motor and battery, is used. A 6-volt, 90-ampere-hour storage battery furnishes the current for driving the dynamo for starting and lighting.

A cone clutch is employed, faced with leather, beneath which five helical springs being installed in bosses for adjusting the tension. Behind the clutch is a Hartford universal joint. The shaft is coupled to the rear section of the shaft by a squared sleeve in which the sections slip. The rear end is connected in the large globe end of the torsion tube containing the propeller shaft.

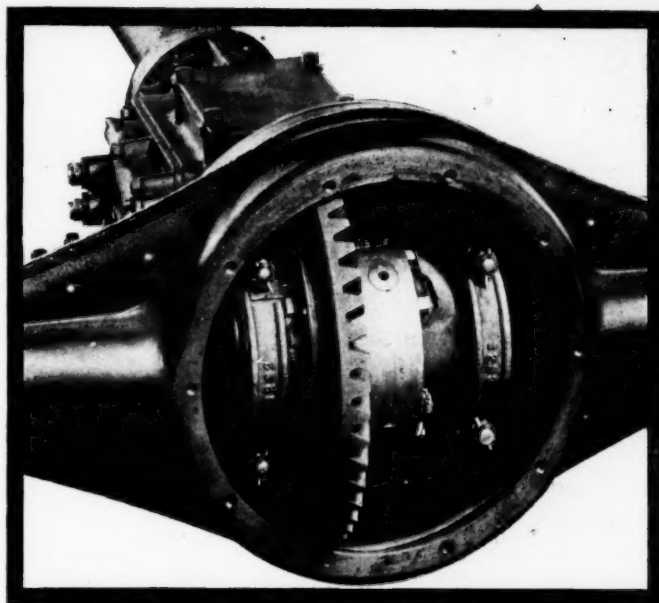
Interlock Provided in Gearset

The gearset is of the selective sliding gear type with three speeds forward and reverse, the driving pinion being on the transmission shaft. There is an interlock between the shafts so that only one of them may be operated at a time. A bronze cage with annular ball bearings carries the differential gear mounting and the bearings may be adjusted at either side to the pinion gear.

The rear axle housing is of pressed steel, the axle being three-quarters floating, of the single-bearing type, with the wheels mounted on annular ball bearings. The driving shafts are 1.5 inches in diameter and the wheels are secured with tapered nuts and keys. The gearset case may be opened at the top or the left side for examination and the differential by removing the cover plate.

The front axle is an I-section drop steel forging 1.75 inches wide and 2.625 inches deep, dropped in the center. The bearings for the pivots are in the yoke instead of in the pivots and the pivot pins are carried in hardened steel bushings. The pivots carry ball thrust bearings at the top and the wheel spindles are fitted with annular bearings.

The springs are of Krupp silico-manganese steel, the front



Rear construction, showing accessibility of bevel gear and differential

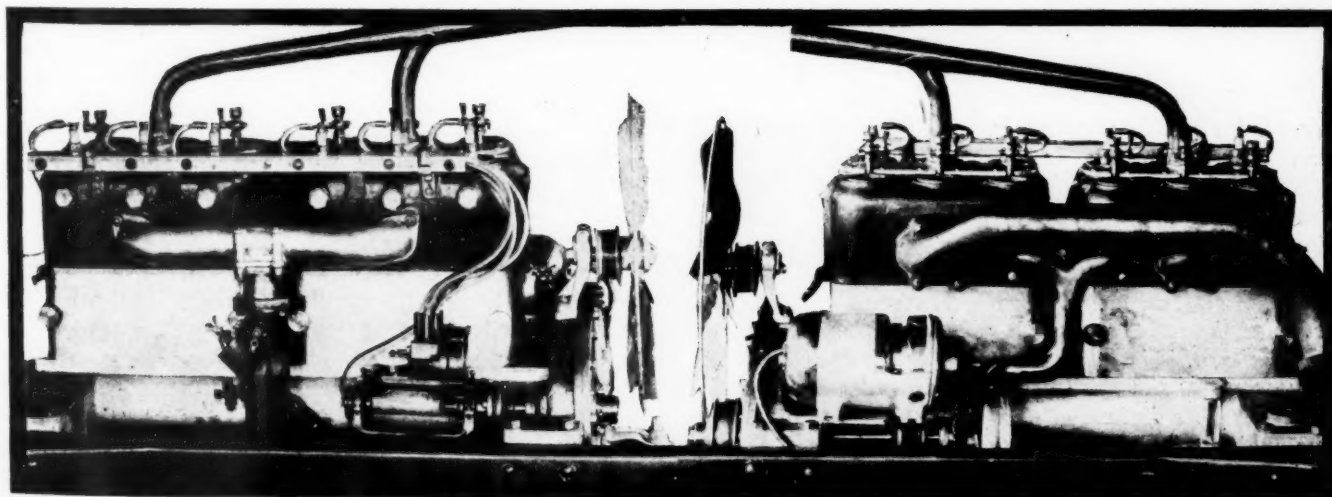
springs being semi-elliptic, 36.5 inches long and 1.75 inches wide, and the rear three-quarters elliptic, 43.5 inches long and 2 inches wide.

The wheels are of the artillery type of second growth hickory, 36 inches in diameter and having twelve spokes 1.75 inches wide. The tires are 36 by 4 inches all around.

The frame is a pressed steel channel section 3 inches wide and 4 inches deep, dropped 3.5 inches forward of the upper half of the rear springs. The heavy rear cross-member is carried beyond the side-members and the ends, supported by brackets, form the upper supports for the springs. The frame is stiffened by the clutch rocker shaft and the control lever shaft.

Lenox cars are furnished in four to seven-passenger touring or inclosed types, as well as in roadsters of two, three, four or five-passenger capacity. All types have a cast aluminum cowl. The 17-gallon gasoline tank is installed beneath the front seat.

All cars are fully equipped, having besides the Gray & Davis starting and lighting system mohair tops, lamps finished in black enamel and nickel, quick detachable demountable rims, foot rail, robe rail, tools, tire holders, bulb horn, adjustable windshield and speedometer. Storage space is provided under the rear seats of the touring cars and the rear decks of the roadsters.



Left—Intake side of the six-cylinder Lenox motor, showing the way in which the valves are inclosed. Right—Exhaust side of the motor with Gray & Davis lighting and starting dynamo



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Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903,
and the Automobile Magazine (monthly), July, 1907.

Announcement

NEXT week THE AUTOMOBILE begins the publication of a series of articles on Carburetion by Robert W. A. Brewer, one of the leading European authorities on the subject. The selection of Mr. Brewer hinged on the fact that during the last year he has traveled extensively in America familiarizing himself with the American carburetor field, which fact, coupled with his comprehensive knowledge of the European carburetor tendencies, admirably fits him for the task of handling the subject from the viewpoint of the old world and also the new. This fits him to present the European theories of gasoline and air regulation, as compared with the accepted American practices. The series will extend over a period of two or three months, appearing every other week. Each article of the series will be short, averaging one and one-half pages in length. The practical and theoretical sides are handled in the series, and attention is given to the actual problems with which the designer and manufacturer are concerned. Within the scope of the series comes the question of temperature and heat units; this is followed by the problem of surface to volume ratio; the third article takes under consideration the jet and its design; in the fourth the value of exhaust gas analyses is considered; the fifth compares American and European design in so far as moving parts are concerned, and the succeeding articles treat with other aspects of carburetion.

Exit the Small Car

The 1913 European Tendencies

EUROPE has ostracized the single-cylinder car. After faithfully nurturing it for over a decade, after developing it to a high stage of perfection, after carrying it to the zenith in the racing field, it has gone down to immediate and inglorious oblivion. Scarcely a relic of it will be found in the offering of France, Germany and England for next year. It has all gone as an avalanche. The single-cylinder type has exited, the small four has occupied the stage. The demand for flexibility has made the change, coupled with the demand for low horsepower rating and low gasoline consumption.

The new four of France, as announced by nearly a score of its prominent manufacturers, has ratings from 8 to 12 horsepower, on a rating which gives the same results as the S. A. E. equation in use in this country and the R. A. C. rating in Europe. True, such a motor is a tiny tot, with its four cylinders in a block casting and often just 2.1 inches in bore and with a stroke of twice that measurement. In millimeters the measurements are 55 x 120, there being very few makers who exceed the 120-millimeter stroke, and with them the bore ranges between 55 and 75 millimeters.

By manufacturing motors of these proportions the efficiency is high and high crankshaft speeds are obtained, in fact, imperative. With such a motor the gear ratio on direct is from 4 to 1 to 6 to 1. With all of them the four-speed gearbox is essential, as it permits of keeping the motor speed up in the efficiency range no matter whether on the level road, on the hill, or on the rough surface. With such motors the fuel economy is from 35 to 45 miles per gallon of gasoline, another essential in continental countries.

European makers are exhibiting much more good judgment in these little cars than merely that of motor economy and flexibility, namely, that weight is being reduced in the general make-up of these cars. A few American makers were early to recognize the merit of weight reduction, but too many of them are still adding more horsepower, adding more weight and cutting the price. This is poor economy to maker and poorer economy to the operator. There is plenty of bore, there is plenty of stroke, and there is plenty of body, but efficiency is lacking all along the line. Refinement and more accurate workmanship are the needs of the hour.

The European small car differs quite radically from the average American small car in that its parts are as finely finished as in the most expensive machines. If shock-absorbers are stock equipment they are in keeping with the gears of the four-speed set, which are of the finest metal manufactured with the highest skill. The ball-bearings used in the big car are found in the smaller one. The same accuracy characterizes every detail of the small creation. Originally the European small car is a more expensive product than the American small car, but it is much cheaper to maintain. Its fuel consumption is very much less; its tire expense is less, and its general maintenance is less because of the materials and workmanship it incorporates.

Trading New Cars for Old Is Bad Salesmanship

President H. O. Smith of the Premier Motor Manufacturing Company Outlines the Standpoint of the Salesman and the Manufacturer and Explains How the Second-Hand Car Problem Will Take Care of Itself

THE automobile is a very live subject. The automobile industry has attracted a tremendous number of very live men—and I can assure you that Indianapolis feels complimented that those men who are gathered here should have spent the time and money that they have in coming to this convention. And may I add that I believe that the selling problem is the big problem, not only with the automobile industry, but with every other line of industry. We soon get to the point where it is not so great a difficulty to produce an article? It may be difficult to produce an article on a basis to properly compete; but the proper distribution of the article, to be able to produce the article could have been made, irrespective of its merits, and then properly distribute it as a problem, and may I say that with the motor car as with all other articles of merchandise nearly, and confining it to the motor car, I believe that a good dealer can hold up a poor car a little while, but a poor dealer cannot hold up a good car very long. Therefore, you see that I place the greatest stress today with the great development of the motor car on the distributor. The development of the motor car and the demand are very natural. It is strictly in line with the times. It is based on the transportation problem, and every agency which has had to do with the transporting of thought, merchandise, or human beings in a more practical and economical way than has been done by other agencies previously employed have invariably met with endorsement and have gone forward.

Prospectives Generally Users

Take the salesman of today: The average salesman that is employed—is it not true that when he first comes to us he presents a list of prospective buyers? Now, follow down this list and what do you find? You find that his list almost invariably includes or is confined to those who today own motor cars, who are already converts to the use of motor cars; but he has conceived the idea that if we pay that man enough money and buy his old car at an attractive enough price to the other fellow, he can possibly place another new car with him. But I want to ask you as practical dealers, have you broadened the influence and scope of the automobile one particle until you have placed that traded-in car, provided it is of any use, if there is any use left in it? I say, No! Of course, we cannot entirely get away from this trading problem, and it is one of the big problems we are all confronted with and wrestling with; but I believe this—as soon as we get to the point where we do not pay any more for the second hand car than the second hand car is really worth or will sell for, that the second hand car problem will to a very great degree take care of itself.

I want all of you dealers to take this as absolutely sincere, and I believe that I am expressing the real feeling of all automobile manufacturers, and I know it is true of the manufacturers of Indianapolis—that they realize and appreciate that the interests of the manufacturer and the interests of the dealer are identical. Every dealer is interested in knowing that the concern with which he is affiliated is prosperous. Every manufacturer on the other hand is interested in knowing his dealer is prosperous.

The manufacturer has two problems—producing and selling. In the selling department every broad gauge distributor must recognize that the dealer associated with his interests is a part of

his selling organization, and why should any dealer join with any distributor that is going to be careless as to the welfare of any part of his selling organization?

We have only scratched the possible surface of the demand for the motor car. The big problem with us today is not—can this country absorb 200,000, 300,000, 400,000 or 500,000 automobiles in a given period? As I see it, the question with us today is—will we develop the uttermost buying power as soon as those cars are delivered?

I could name you one city in the United States which last fall, according to the record, had one automobile, I believe, to every nineteen men, women and children, and yet that city proved to be one of the best markets of the past season. This only gives you a suggestion of the great possibilities that are before us.

Looking at the commercial side of the proposition, the huckster who today is within only 5 or 6 miles of the city and compelled to do his work on land valued at \$100 to \$1,000 per acre, with good roads and the motor propelled vehicle, instead of being located in or very near to the city limits, will be operating 5, 10 and 15 miles from the city on \$150 to \$200 an acre land. This is also true of many suburban residents now concentrated about the railroad station when there are hundreds of acres of more desirable land further removed. The tendency of population is away from the city and the suburbanite needs an automobile.

So that, gentlemen, we may all figure without a question on the permanence of the motor car. Why? Because it is a practical proposition. Its demand is on a practical basis. You need not fear anyone who has once kept it, the use of the motor car reverting to the old methods if it is possible for him to continue to have an automobile. It would be just as reasonable for us to think of us turning back to the prairie schooner or the horse-drawn street car as to go back to the old methods of transportation.

The dealer today in many instances when he approaches the manufacturer first asks, not for "Let us see what the details of your product are," but "What is your discount?"

All Are Entitled to Profits

I think there is one of the specific things we might all think about very seriously. The manufacturer is entitled to a fair, legitimate profit. The dealer is entitled to fair, legitimate profit. But there is a limit to what represents a fair, legitimate profit, and the profitable business at the end of the year is not always traced to the largest discount. You must remember that low basic cash list prices and long discounts cannot run together. It ought to be true that the straight cash buyer gets the best price. It is not always so. We very often forget that so much cash and so much allowed for a car do not always represent the net cash return; so that I think it is fair to the manufacturer, and it is to the dealer's interest, to consider the product first that is offered, and the discount second. There is not a dealer in this house but what will say, "I will take a modest but fair discount if I have a product that can sell for the full amount, rather than take an abnormal discount which might carry with it a less profit; a lower price, which does not command cash returns in the majority of instances.



ALERT in mind, though dwelling on limited areas when measured with American standards, inventors and engineers of central and western Europe, including the United Kingdom, are ever at work to improve on past practice, especially in the youngest of professions, the automobile industry. Though their efforts attack problems of many classes, a few great tasks seem uppermost in most minds now, these referring to the construction of sensitive carbureters and highly efficient valve mechanisms. At the same time, other details are also being improved, both as regards engine operation and increased comfort of the passengers of the automobile, and some very clever devices proposed to solve the wheel-and-tire problem have been introduced in European patent offices. In this review THE AUTOMOBILE gives abstracts of the most interesting automobile patents which were granted by the British Patent Office during the month of August.

Manufacture of Tires—Describing a new type of mold in which casings are formed.

This patent has reference to a machine for the molding of sectional tires, these being shaped on cores C of elliptical cross-section. While these cores give the inside surface of the casings its shape, the outside is formed by a mold either composed of two parts which are clamped together, or, as in Fig. 1, of packing material P. This is made up from layers of metal or rubber and fabric which are held in position by a wrapper W. The convex portions of the outer mold which serve for the shaping of the casing beads are reinforced by thin metal strips M.

No. 9,321 British—to Margetts International Sectional Tire Company, London, England. Granted August 8, 1912; filed April 15, 1912.

Gasolene Engine Carbureter—Operating on the principle of surface radiation for the evaporation of the fuel.

As Fig. 2 shows, the carbureter referred to in this patent is formed as a chamber C jacketed at J and containing a number

of foraminous screens S, onto which fuel is sprayed from a nozzle N which is controlled by a needle valve V. The air drawn in by the engine enters through the carbureter valve V₁ mounted eccentrically upon a shaft V₂. The opening L in this valve represents a low-speed air passage which remains open even at the minimum motor speed. The air supply which is swept along the curved wall of the chamber C is thereby given a whirling motion and is heated by contact with the jacketed walls, while the starting air is heated by the following device: A cylindrical screen S₁ containing concavo-convex screens S₂ and inclosed with them in a casing C₁, is heated by removing the casing, pouring gasoline over the screens and igniting it, after which the casing C₁ is replaced, while air enters through the ports A. The throttle valve T serves to regulate the amount of mixture drawn into the motor, the air used for this purpose being so directed by the valve V₁ that it strikes the screens S, whose large surface assists in the evaporation of the fuel sprayed upon them by the nozzle N.

No. 9,504 British—to W. P. Thompson, Liverpool, Eng. Granted August 8, 1912; filed April 19, 1912.

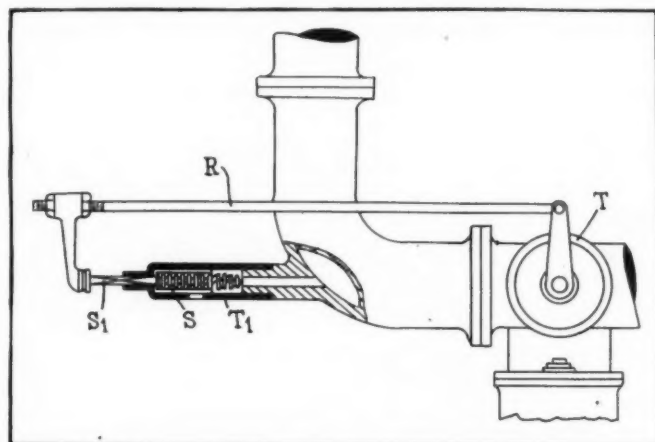


Fig. 4—Webb positive-acting auxiliary air supply for gasoline engine carbureters

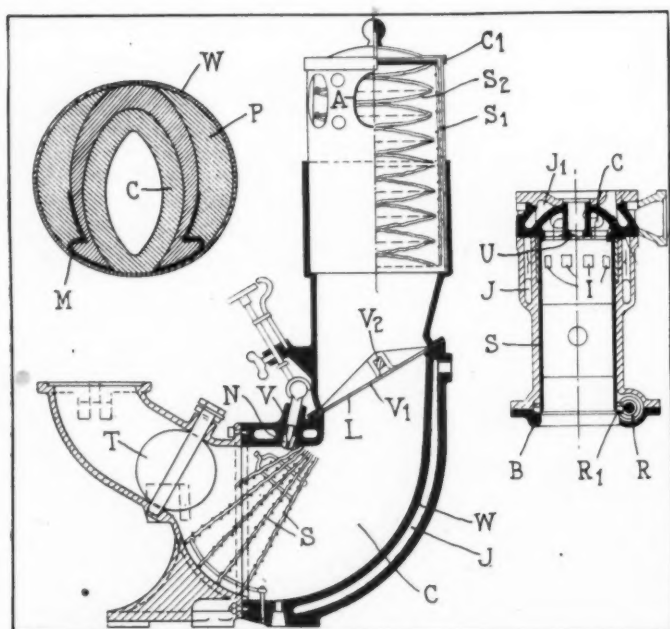


Fig. 1—Margetts tire-making mold. Fig. 2—Thompson screen carbureter. Fig. 3—Gerhardt sleeve-valve motor

Sleeve Valve and Its Cooling—Being a cylindrical valve which is intermittently rotated by a grooved roller.

The sleeve valve S, Fig. 3, is contained inside the cylinder of an internal combustion motor, being closed in the same and having its upper end U fit tightly against the lower surface of the cylinder head, in which an exhaust chamber C is formed. Exhaust ports provide communication between combustion and exhaust chambers when the sleeve is in certain positions, while the admission of fresh gas is governed by a series of intake ports in the wall of the sleeve which are arranged slightly below the level of the horizontal exhaust ports. The fresh mixture before entering the cylinder passes through the jacket surrounding its walls, thereby cooling it, while the same end is obtained in the case of the cylinder head by water circulated through its jackets. The rotation of the sleeve valve S, which is stationary during the compression and explosion strokes, is had by the use of a grooved roller R engaging a series of rollers R₁ mounted upon the lower periphery of the valve.

No. 9,741 British—to P. Gerhardt, Wilmersdorf, Berlin, Germany. Granted August 8, 1912; filed April 21, 1912.

Internal-Combustion Motor Carbureter—In which the auxiliary air valve is operatively connected to the throttle shaft and positively operated.

Positive action of the auxiliary air valve of the carbureter referred to in this patent is obtained by using a valve in the form of a spring-loaded sleeve S which has a port in its wall and slides in a tubular support T₁. To prevent rotation of the valve, its spindle is squared, and, as Fig. 4 shows, the valve is connected by a link and the rod R to the throttle T so that when the latter is opened to a predetermined extent the sleeve is moved in its support, admitting air through a port in the cylindrical wall of the same.

No. 11,180 British—to G. Webb, Monmouth, Eng. Granted August 28, 1912; filed May 9, 1912.

Pneumatic-Tire Tread Band—Composed of studded fabric or leather which may be bolted to a suitably shaped tread surface.

The subject-matter of this patent are the tire and tire cover shown in Fig. 5. This tire comprises a fabric layer F around which is arranged a leather layer L built in two parts. These

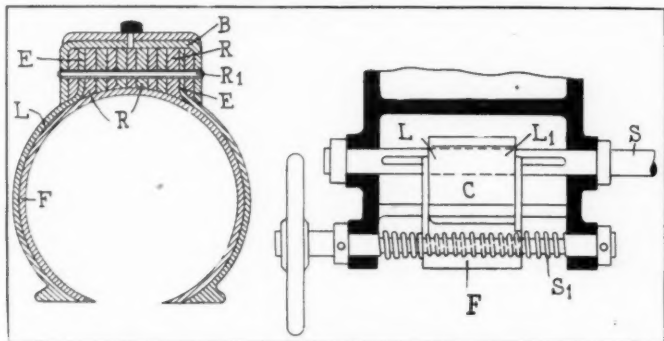


Fig. 5—Withy pneumatic tire tread. Fig. 6—Baird two-cycle motor intake valve

parts have upstanding edges E, between which rings R, made of leather, compressed fabric or any other suitable dense material are secured by tubular rivets R₁. The layer L may be covered by a studded rubber or fabric tread band B which is punched and may be secured to the layer by bolts or laces passed through the rivets. It is not necessary to use the tread band with the tire.

No. 11,449 British—to R. Withy, North Camberwell, London, Eng. Granted August 28, 1912; filed May 11, 1912.

Intake Valve Mechanism—In which part of the charge is returned to the compression chamber.

The admission valve, Fig. 6, is designed for the use with two-

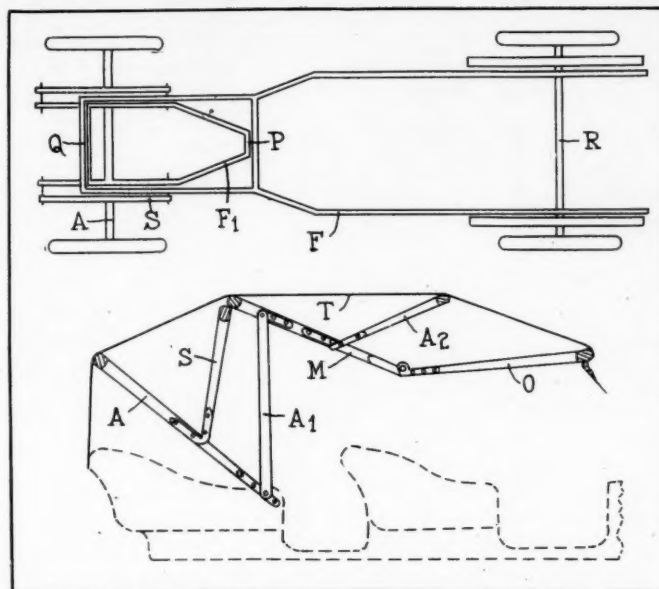


Fig. 7—Cleaver frame and subsidiary frame construction. Fig. 8—Hennessy automobile top construction

cycle motors returning part of their charge to the crankcase or whatever compression space takes the place of the same. The valve is actuated by a cam C mounted on a spindle S and adjusted axially by a fork F which engages a screw S₁. The cam has surfaces of different lengths, L and L₁, which determine the period during which the admission valve remains open.

No. 11,340 British—to J. O. Baird, North Shields, Eng. Granted August 28, 1912; filed May 10, 1912.

Motor Vehicle Design—Comprising a secondary frame upon which the front portion of the vehicle is carried.

This patent refers to the construction of an automobile, as shown in Fig. 7, in which the main frame F is carried by the rear axle and resiliently supported on it. At two points, P and Q, a subsidiary frame F₁ is pivotally connected to frame F in a substantially longitudinal, horizontal axis. The subsidiary frame is also given a resilient support by spring S which rests upon the front axle.

No. 9,444 British—to H. C. Cleaver, London. Granted August 8, 1912; filed April 18, 1912.

Automobile Top Construction—In which the top is attached to the body at two points only.

This patent refers to a top construction, Fig. 8, in which, on

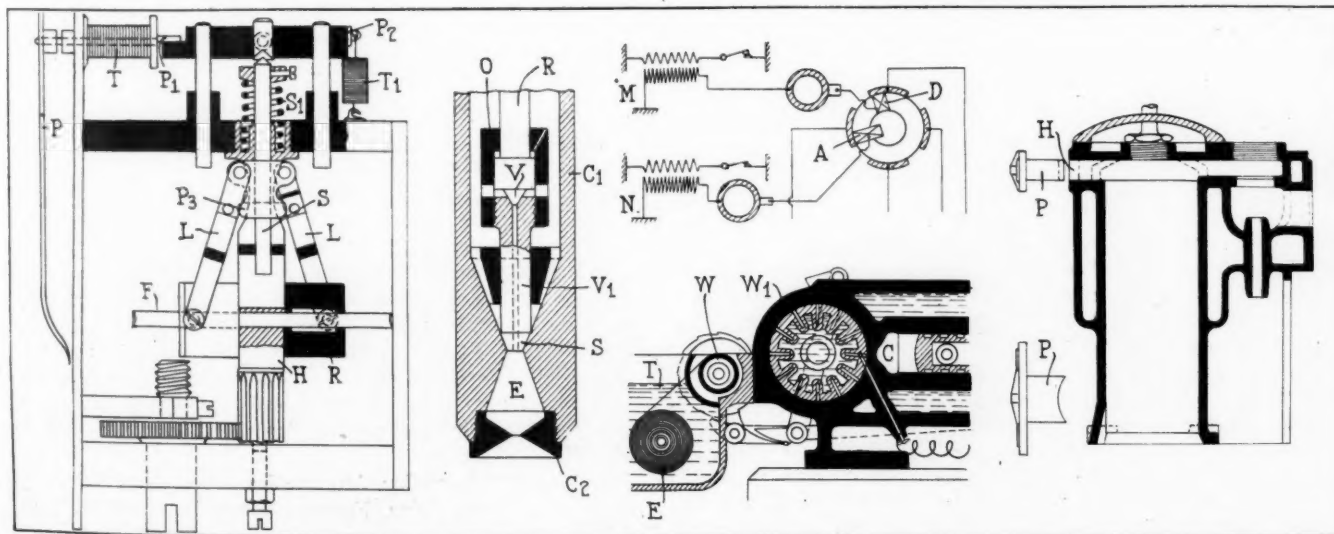


Fig. 9—Robinson centrifugal speedometer. Fig. 10—Breuer fuel admission device. Fig. 11—Bosch two-magneto ignition. Fig. 12—Thorn explosive motor. Fig. 13—Wingfield cylinder-cleaning design

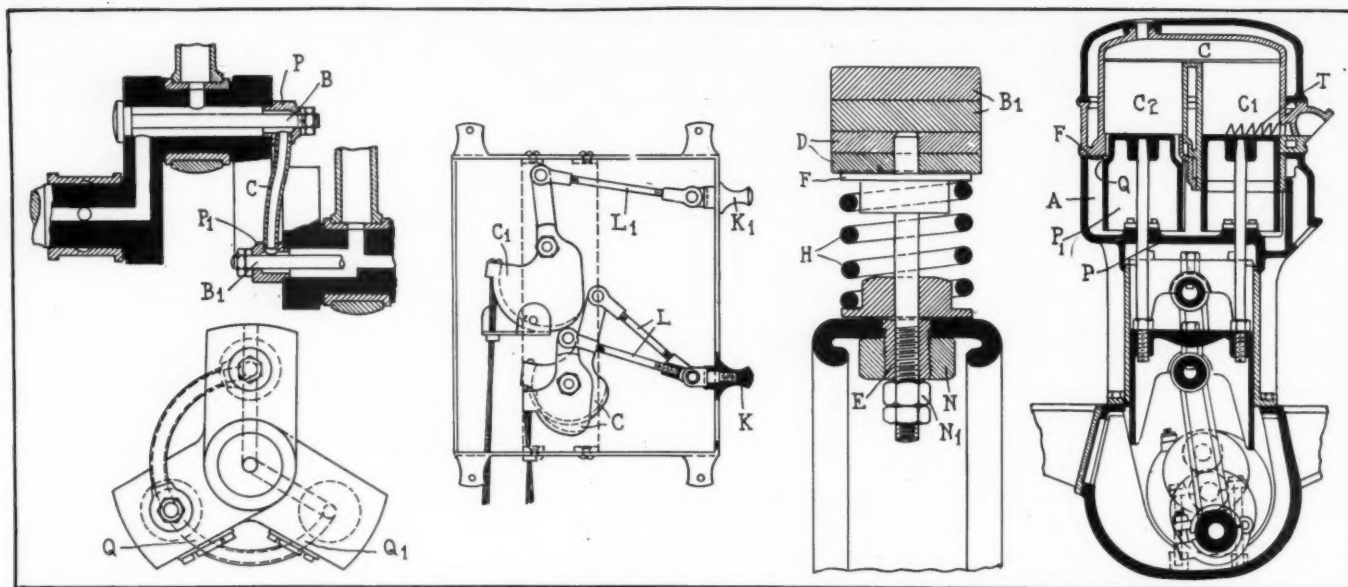


Fig. 14—Delaunay-Belleville crankshaft lubrication. Fig. 15—Bowden control mechanism. Fig. 16—Sutcliffe coiled-spring automobile tire. Fig. 17—Giles twin-cylinder automobile engine

each side of the top, an arm A is hinged to the body of the vehicle at V, at the rear of the entrance doors. The arm A is connected to the arm M by the hinged rod A₁ and the short arm S. An outrigger arm O extends over the driver's seat, and an auxiliary arm A₂ supports the top material T.

No. 9,334 British—to A. Hennessy, Liverpool, Eng. Granted August 8, 1912; filed April 26, 1912.

Centrifugal-Force Speedometer—In which weights move radially on a transverse rod.

This patent refers to a centrifugal speedometer, Fig. 9, construction in which the indicator is moved by a spring control. The rotating masses R which serve as a governor are carried by a hollow central spindle H, they being free to move radially on the transverse rod T. As they move, they lower through links L the spindle S which is axially positioned in the spindle H and movable independently of the same. The depression of the spindle S acts against the resistance of a spring S₁ which is followed by a plate P₂ pressed down by the springs T and T₁. The latter spring tends to rotate the indicator P so that its movement is arrested by the abutments of the eccentric pin P₁ against a cutaway portion of the plate P₂.

No. 9,929 British—to J. W. Robinson, London. Granted August 14, 1912; filed April 24, 1912.

Internal-Combustion Engine—Describing a fuel admission device for a type of engine in which liquid fuel and air are admitted to the engine cylinders.

The subject-matter of this patent, a fuel admission device, is seen in Fig. 10. It consists of a conical valve V seated in the throat of a Venturi tube. When fuel is admitted to the interior of the casing C₁ it passes to the top of the valve seat S, and, when the valve rod R lifts, lost motion between valve V and its cap causes the valve V to be opened first. As the rod R is lifted further, the valve V₁ is unseated and fuel is admitted into the expansion chamber E where air is mixed with it and whence it is passed through an orifice in the removable cap C₂.

No. 10,365 British—to A. B. Breuer, Manchester, Eng. Granted August 21, 1912; filed April 28, 1912.

Magneto Ignition for Automobile Motors—Comprising two current sources independent of one another and operable on the same set of spark-plugs.

The invention to which this patent relates consists in the use of two distinct sources of ignition current, one of which is used for starting and the other during the continued running of the motor. Confusion of the currents is prevented by the use of a distributor in the secondary circuits. The diagram, Fig. 11, shows the arrangement of this ignition system for a four-

cylinder motor. The distributor arm D is connected to the magneto M serving for normal running of the motor, while the arm A is connected to the starting magneto N, which latter may be driven by hand or by a spring wound by the driver or the engine. The angular distance of the arms D and A corresponds to the difference in timing for starting and normal running.

No. 9,840 British—to Robert Bosch, Stuttgart, Germany. Granted August 14, 1912; filed April 22, 1912.

Explosion Motor Proper—Utilizing as fuel an explosive which is decomposed when submitted to an electric or other kind of shock.

An engine which is driven by the use of an explosive instead of a fuel burning in the presence of oxygen is shown in Fig. 12. The explosive E, in the shape of one or more bands, is kept in a water tank T on a wheel submerged in water, whence it is fed to a drying wheel W and to chambered wheel W₁. The latter cuts off pieces of the explosive band or bands, the size of these pieces being capable of regulation. In a cylinder C the explosive is exploded by an electric spark.

No. 10,011 British—to M. Thorn, Hamburg, Germany. Granted August 14, 1912; filed April 25, 1912.

Cylinder Cleaning Opening—Which is provided in the upper portion of the wall and is ordinarily closed by a plug.

A cylinder may be cleaned upon removing a plug P which fits into a hole H formed in its wall, Fig. 13. The most advantageous position is opposite the valves, or, at any rate, such that the valves and spark-plug will not be interfered with upon cleaning the interior of the cylinder.

No. 9,994 British—to W. Wingfield, Norbury, Surrey. Granted August 14, 1912; filed April 25, 1912.

Method of Lubricating Crankshafts—In which the influence of centrifugal force is overcome.

The lubricating systems for bored crankshafts illustrated in Fig. 14 is applicable to engines whose shafts have at least three crankshaft throws between each two bearings. The lubricant flows through circular tubes C, which are either secured to connecting pieces P, P₁ fastened to the crankpins by bolts B, B₁ or to flanged pieces registering with passages Q, Q₁. In either case the use of passages C avoids the deterring effect of centrifugal force upon the lubricant passing from end crankpins to the middle of the shaft.

No. 10,629 British—to Soc. Anonyme des Automobiles Delaunay-Belleville, St. Denis, Seine, France. Granted August 21, 1912; filed May 2, 1912.

Driver's Control Mechanism—Comprising a group of Bowden wires.

This patent has reference to a control system as seen in Fig. 15. Bowden wires are used to provide connections between the mechanisms to be governed and knobs K and K₁, which are fastened to the dash and in reach of the driver. Each wire is operated through a cam C, C₁ and a link L, L₁, in turn actuated by the knobs mentioned. The latter are forced to move in a straight path by the shape of their bearings.

No. 10,661 British—to Bowden Brake Company, Birmingham, Eng. Granted August 21, 1912; filed May 2, 1912.

Mechanical Automobile Wheels—In which helical springs are used to insure resiliency and leather to form the tread surface.

In this wheel, Fig. 16, a series of studs are used which are formed, near their outer ends, with collars having flanges F. The inner ends of the studs are screw-threaded and pass through flange blocks D. The latter are held in place inside the rim by screwed extensions E and nuts N. Between the flanges helical springs H are in position which provide resiliency. The flexible portion of each wheel is made up by a rubber or leather-band tread B and non-stretchable belting D. Lateral movement of the tire is averted by the engagement of the extremity of the stud and a circumferential slot. The tire is put in place on the wheel felloe by drawing in the studs, this being done by means of the nuts N₁.

No. 10,722 British—to E. Sutcliffe, Brighouse, Yorkshire, Eng. Granted August 21, 1912; filed May 3, 1912.

Internal-Combustion Engine—In which a pair of cylinders is formed with a common combustion space.

The engine described in this patent and shown in Fig. 17 has a pair of cylinders having a combustion space C in common. The front ends of the cylinders open into a single compression chamber separated by a partition P from an inclosed crankcase. Through the port X a combustible mixture is allowed to enter the pump space A, passing thence to the cylinder C₂ through inclined ports Q in the piston P₁. The exhaust leaves through triangular ports T. A flange F supports the cylinders on the top portion of the basechamber.

No. 10,563 British—to J. A. Giles, Derby, Conn., U. S. A. Granted August 21, 1912; filed May 1, 1912.

Internal-Combustion Motor Valve—Being of the rotary distributor type.

The rotary valve V, Fig. 18, serving inlet and exhaust controls a port P covered by the piston when at its upper center and has passages E₁ and E₂ leading to the inlet and exhaust manifolds, respectively. These passages are so inclined as to have their axes intersect near the port P. The valve body has recesses in which sliding pieces are contained, being pressed away from the cylinder by springs. Thus, during compression and power stroke, tight fits are obtained between the valve body and the inlet and exhaust passages. The manifolds F₁ and F₂, for inlet and exhaust, have removable covers G₁ and G₂, so that, when the valve is withdrawn, access may be had to the port P.

No. 11,300 British—to H. V. J. Jouffret, Paris, France. Granted August 28, 1912; filed May 10, 1912.

Automobile Carbureter—In which the proportions of hot and cold air may be regulated.

The subject of this invention is seen in Fig. 19, showing a hollow tube T with a perforated conical end E located above the mixture tube M of the carbureter. Tube M is surrounded by a chamber C containing a helical rib H and heat-absorbing packing. Exhaust gases passing through C heat the rib H. For starting the tube T, through which the hot-air supply enters, is heated by wires W₁ connected with a battery, while cold air may be admitted through valve V. The valve V controls the mixture produced by the air entering through holes H₁ and fuel from the nozzle N.

No. 10,988 British—C. T. B. Sangster and W. Evands, Birmingham, Eng. Granted August 28, 1912; filed May 6, 1912.

Intake Valve Gear—Referring to motors to be operated by compressed air when ignition system fails.

This patent relates to a type of internal-combustion motor which is now principally used for marine purposes, and in which compressed air is used for starting as well as in case of failure of the ignition system. The compressed air is admitted to the cylinder by way of a mechanically actuated valve V, Fig. 20, and an automatic one V₁, which is so constructed that pressure and duration of air supply is automatically regulated, to prevent the admission of air when the engine operates on the ignition system and under reduced loads. The valve V has a double stroke and during part of the explosion stroke it is opened by forward or reverse cams C, which are tapered and axially adjustable. The control is by a lever connected to the throttle and a pressure-reducing valve in the compressed-air passage.

No. 11,230 British—to C. H. T. Alston, London. Granted August 28, 1912; filed May 9, 1912.

Multi-Jet Carbureter—In which the fuel jets are formed by grooves in the carbureter casing.

In this carbureter, Fig. 21, gasoline enters through the float-chamber F cast integral with the carbureter casing C, whereby a space F₁ is formed which serves as a hot-air jacket. The fuel passes from F to a series of jets P₃ which are formed as grooves in the conical surfaces of the casing C and a liner L and are arranged over one-fourth of the inner circumference of C. The suction-actuated piston P regulates both the hot-air and fuel supply through P₁ and the auxiliary-air supply entering by way of P₂. It has a triangular port Q with apex uppermost to control the number of jets in action. To keep constant the length of the port portion of P₁ open to incoming air, a triangular port is placed adjacent to Q. Air ports P₂ are controlled by ports Q₁ in P, registering with them and thereby providing passages. The baffle B on the piston P is designed to facilitate the mixing of air and fuel.

No. 11,167 British—to H. Lindblom, Liverpool, Eng. Granted August 28, 1912; filed May 9, 1912.

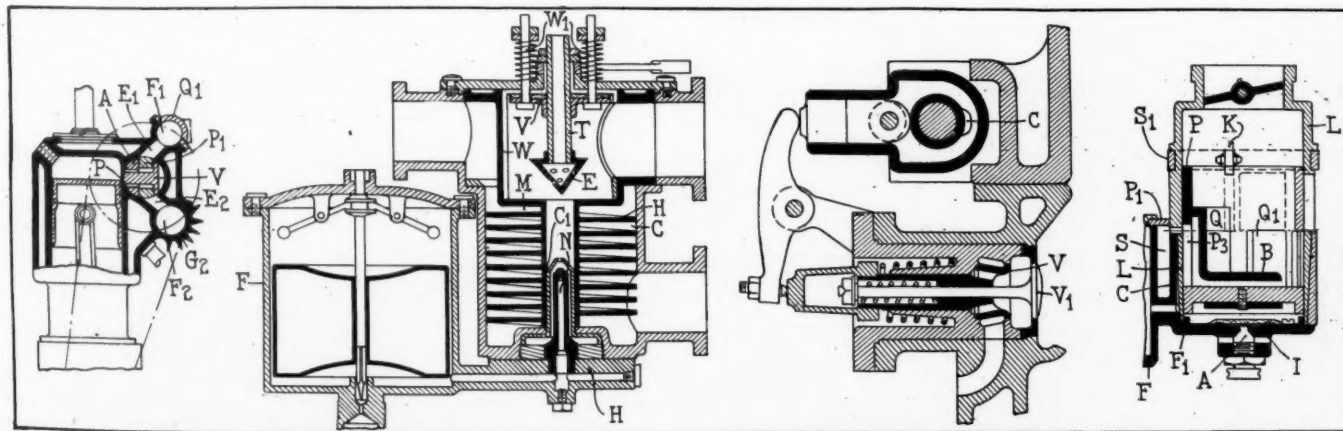
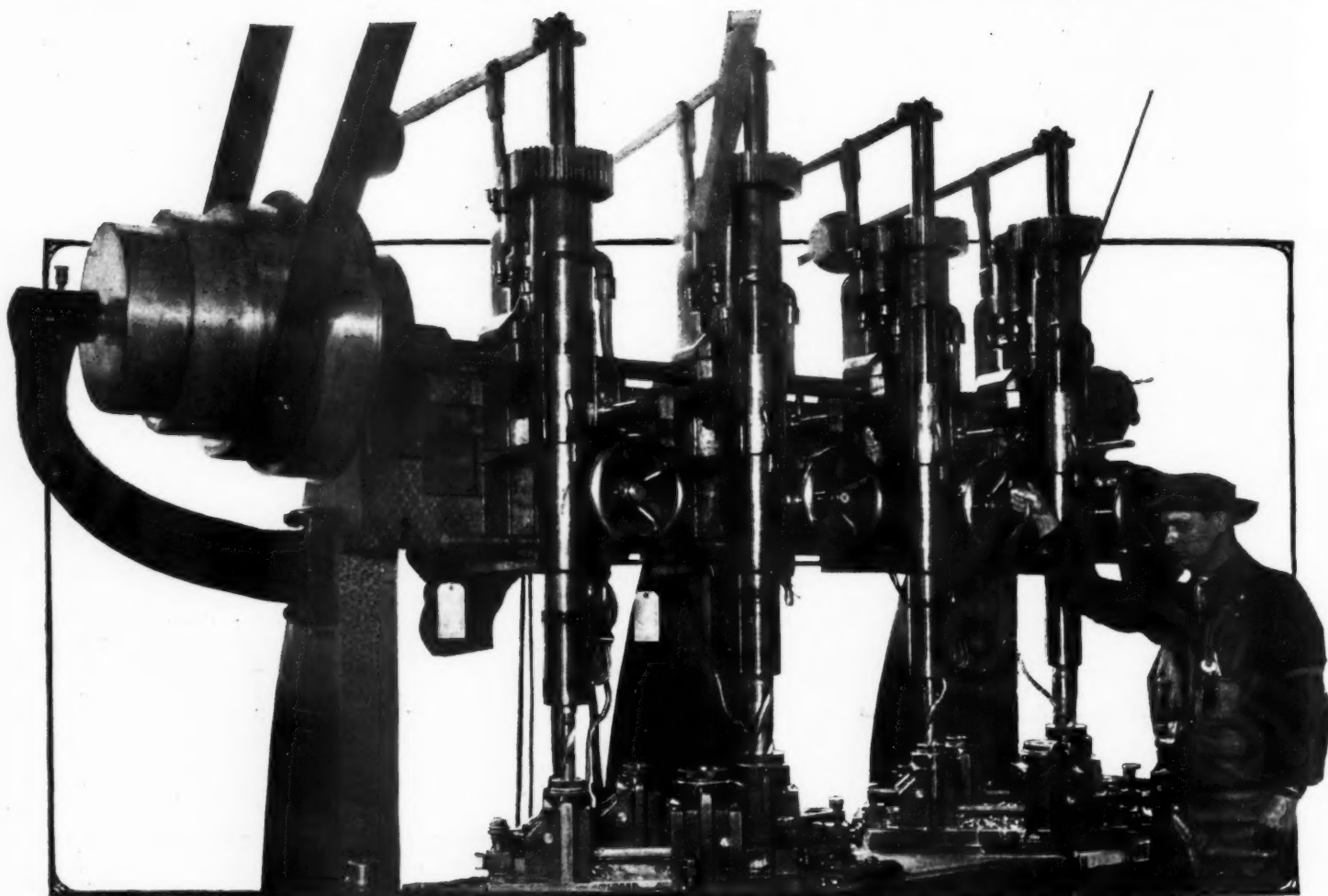


Fig. 18—Jouffret rotary valve automobile motor. Fig. 19—Sangster-Evands carbureter adjustable for hot-and-cold air ratio. Fig. 20—Alston intake valve gear. Fig. 21—Lindblom carbureter.

Factory Miscellany



Connecting-rod boring machine used by the Chalmers Motor Car Company, Detroit, Mich. It turns out 300 rods per day

Chalmers connecting rods are made in quantities. In the above illustration is shown a machine that is a true time-saver. This machine has been used extensively in locomotive building and has proved its merit in the shops of the Baldwin Locomotive Works. It has been taken over by only two automobile concerns for use in the manufacture of connecting-rods, the Chalmers company being one of them. This machine can turn out a completely bored connecting-rod in 3 minutes. It takes an operator and a helper to work it and by its use they can turn out approximately 300 finished connecting-rods in one day. Before the installation of this big

machine the work was done on three small machines, each requiring a man to run it and the combined capacity was seventeen connecting-rods. The machine has been rebuilt from its original form and now has three spindles, allowing many parts of the work to overlap each other when the operator and his helper are working together. The saving of time and money has been considerable but what is of equal importance is the saving in total floor-space required per part produced. In other words, the output has been increased while the required space per part has been decreased, thus securing a highly desirable point in the increase of factory efficiency.

K LINE'S Richmond Plant—Twenty employees of the Kline Motor Car Corporation, York, Pa., including a number of mechanics and other workmen, left recently for Richmond, Va., in order to install the machinery and complete the other preliminaries for the opening of the company's new plant in that city. The factory is built in two parallel wings, connected at one end by a shorter wing, in front of which and connected with it is a two-and-one-half-story office building. The material is brick and the trimmings are of white stone. The structure stands on a concrete foundation and the floors of the factory are cement. The accompanying illustration shows the factory.

Electric Company Incorporated—The Electric Motor Sales and Repair Company is the name of a new plant recently incorporated to do business in Winnipeg, Man.

Cadillac's Addition—The Cadillac Motor Car Company, Detroit, Mich., has taken out a building permit covering the erection of an addition to its plant, to cost \$29,000.

Goodyear Building—The Goodyear Tire & Rubber Com-

pany, Akron, O., is having plans prepared for two large additional factory buildings, the erection of which will be started early next spring.

Purchase Findlay Property—A group of Toledo, O., and Lima capitalists have formed a syndicate with a view to purchasing the property of the Findlay Motor Company, Findlay, O. If the deal is consummated the plant will be operated at Findlay.

Knight Builds Addition—The Knight Tire & Rubber Company, of Canton, O., which recently increased its authorized capital stock from \$331,500 to \$1,500,000, will erect a large addition to its plant. When the new structure is completed the capacity of the plant will be largely increased.

Hart Company in Canada—The Hart Accumulator Company, of London, Eng., manufacturer of storage batteries, will establish a factory in western Canada. E. J. Clarke, managing director of the company, will recommend that a large plant be built at either Winnipeg or Fort Williams, Ont.

Only Temporary Quarters—The Lavigne Gear Company,

formerly of Corliss, Wis., and now located at Racine, Wis., is temporarily occupying part of the old Racine-Sattley Company's plant, and the recent move was in line with its plans to establish a permanent home of its own in Racine. The Lavigne company during last week occupied factory No. 17 of the Racine-Sattley works, affording 48,000 square feet of floor space. Two hundred men are now employed, and the output is being considerably enlarged. As soon as the officers have selected a site for permanent location, ground will be broken for a large and modern fireproof factory.

Rebuild Forge Shops—The Studebaker Corporation is preparing to rebuild the forge shops at Clark street, Detroit, Mich.

Chalmers to Build—The Chalmers Motor Car Company, Detroit, Mich., has given construction contracts for a plant addition.

Hudson Plans Addition—The Hudson Motor Car Company, Detroit, Mich., plans to build an addition to its plant at Oakland, Cal.

Croze Truck's Factory—The Croze Auto Truck Company is taking bids for a two-story truck factory, 80 feet by 140 feet, to cost \$30,000.

Jackson's Factory Plans—The Jackson Motor Car Company, Jackson, Mich., contemplates a branch factory, to cost approximately \$200,000.

Kelly Awards Contract—The Kelly Motor Truck Company, Springfield, O., has awarded the contract for the erection of its proposed factory addition.

Eclipse Enlarges—Contracts have been let by the Eclipse Machine Company, Elmira, N. Y., for an addition, 125 feet by 60 feet, to their factory building.

Federal Building—The Federal Motor Company, Indianapolis, Ind., has given a contract for a factory addition, one-story high, and to cover 50,000 square feet.

Truck Company Builds—The Hydraulic Auto Truck Company is planning the erection of a plant at Los Angeles, Cal., for the manufacture of hydraulic trucks. W. E. Barnes is president, and D. L. Whitford is general manager.

New Birmingham Company—Automobile tops, cushions and covers are being manufactured in Birmingham, Ala., by the recently organized Birmingham Auto Top Company. This is the only plant of its kind in the South. The company is capitalized at \$60,000, which was subscribed locally. C. R. Christopher and C. G. Ryan organized the company and are at the head of its management.

Calendar of Coming Automobile Events

Shows, Conventions, Etc.

- Nov. 16-23.....Atlanta, Ga., Annual Show, Auditorium-Armory, Atlanta Automobile and Accessory Association.
 Jan. 2-10.....New York City, Importers' Salon, Hotel Astor, Importers' Automobile Alliance.
 Jan. 4-11.....Cleveland, O., Annual Automobile Show.
 Jan. 4-11.....Montreal, Que., Montreal Motor Show, Drill Hall and 65th Regiment Armory.
 Jan. 11-25.....New York City, Thirteenth Annual Show, Madison Square Garden and Grand Central Palace, Automobile Board of Trade.
 Jan. 20-25.....Philadelphia, Pa., Annual Automobile Show.
 Jan. 22-25.....Geneva, N. Y., Annual Automobile Show.
 Jan. 25-Feb. 1.....Montreal, Que., Automobile Exhibition, R. M. Jaffray, Manager.
 Jan. 27-Feb. 1.....Buffalo, N. Y., Annual Automobile Show.
 Jan. 27-Feb. 1.....Detroit, Mich., Annual Automobile Show.
 Jan. 27-Feb. 1.....Scranton, Pa., Annual Automobile Show, Hugh B. Andrews.
 Jan. 30-Feb. 1.....Canandaigua, N. Y., Annual Automobile Show.
 Feb. 1-8.....Chicago, Ill., Annual Automobile Show.
 Feb. 10-15.....Chicago, Ill., Truck Show.
 Feb. 10-15.....Minneapolis, Minn., Annual Automobile Show.
 Feb. 11-15.....Ottawa, Ont., Annual Automobile Show.
 Feb. 15-22.....Newark, N. J., Annual Automobile Show, First Regiment Armory, New Jersey Automobile Exhibition Company.
 Feb. 17-22.....Kansas City, Kan., Annual Automobile Show.
 Feb. 24-Mar. 1.....Cincinnati, O., Annual Show, Music Hall, Cincinnati Automobile Dealers' Association.
 Feb. 24-Mar. 1.....Omaha, Neb., Annual Automobile Show.
 March 3-8.....Pittsburgh, Pa., Annual Automobile Show.
 March 8-15.....Boston, Mass., Annual Automobile Show.
 March 19-26.....Boston, Mass., Annual Truck Show.
 March 24-29.....Indianapolis, Ind., Annual Automobile Show.

Race Meets, Runs, Hill Climbs, Etc.

- Nov. 9.....Sociability Run, Louisville, Ky., Louisville Automobile Club.
 Nov. 29-30.....Richmond, Va., Track Races, State Fair Grounds, Richmond Automobile Club.
 May 30.....Indianapolis, Ind., 500-Mile Race, Speedway.

Proposed Contests

- Nov. 3-5-6.....Track—Shreveport, La., Shreveport Automobile Club.
 Nov. 7.....Track, Santa Rosa, Cal., Barney Oldfield.
 Nov. 9.....Track, San Jose, Cal., Barney Oldfield.
 Nov. 10.....Track, San Francisco, Cal., Barney Oldfield.
 Nov. 13.....Track, Stockton, Cal., Barney Oldfield.
 Nov. 15.....Hill Climb, Greenville, S. C., Automobile Club.
 Nov. 16, 17.....Track, Sacramento, Cal., Barney Oldfield.
 Nov. 23, 24.....Track, Fresno, Cal., Barney Oldfield.
 Nov. 28-29.....Track—Richmond, Va., Richmond Automobile Club.
 Nov. 28.....Road Race—Visalia, Cal., W. H. Lipton.



New factory of the Kline Motor Car Corporation at Richmond, Va., to which the company is now moving its machinery and equipment

BULLETIN News of the Week Condensed



New type of De Dion bus adopted by the Fifth Avenue Transportation Company, New York City. Old type is shown in the background

NEW De Dion Bus—The Fifth Avenue Bus Company, Æolian Building, New York City, recently purchased a De Dion bus. Its horsepower is 36, bore 110 millimeters, stroke 130 millimeters; the wheelbase is 13 feet, and the weight 10,000 pounds. Its inside carrying capacity is 25 and the outside is 22. It has three speeds forward and one reverse. The above photograph gives a comparison of the old style of bus and the new.

National Moves in Boston—W. H. Stevens, who has the National agency in Boston, Mass., has moved from the Autocar building on Beacon street to 1920 Boylston street near Massachusetts avenue.

Limric as a Lecturer—Howard B. Limric, manager of the New England branch of the Goodrich Rubber Company recently delivered a lecture illustrated with lantern slides to the students of the Boston Y. M. C. A. automobile school.

Lowe Makes a Change—L. H. P. Lowe, formerly connected with the Charles T. Jeffery Company, of Boston, Mass., handling the Rambler line, has resigned to accept a position as sales manager of the Dodge Motor Vehicle Company in that city.

Ford Removes—The Ford Motor Company, Philadelphia, Pa., has removed to 257-259 North Broad street. The past week also witnessed the opening of the Ford company's new service and assembly building at South Sixteenth street and Washington avenue.

Bay State A. A. Plans Banquet—The officials of the Bay State A. A. of Boston, Mass., are planning to hold the annual banquet of the association in Boston on December 8 and some of the prominent manufacturers will be invited to address the members.

Shouse Sales Manager—E. A. Shouse has been appointed sales manager of the C. & F. Motor Car Company, San Francisco, Cal.

Large Contract Given—The Jackson-Church-Wilcox Company, Saginaw, Mich., has closed contracts for a volume of steering gears for 1913 cars between 75,000 and 85,000.

Premier's Fall Display—The Premier Motor Sales Company, Indianapolis, Ind., is holding its annual fall display and opening in its salesrooms in North Delaware street. The rooms are attractively decorated in autumn leaves and the complete Premier line is on display.

Roberts Resigns—Thomas R. Roberts has resigned the sales managership of the United Motor Philadelphia Company and formed a co-partnership with Charles M. Reeves, to take over the local agency of the Marion. Under the firm name of Roberts & Reeves headquarters have been established at 1336 Race street.

Minnesota's Road Improvement—Contracts for construction of 2,700 miles of highway in Minnesota next summer will be authorized by the state highway commission. Seven hundred miles will be absolutely new road in the northern part of the state. Surveying, stumping and sand hauling will be done in the winter. The mileage will be completed by fall.

De Tamble's Troubles—E. N. Hill, Thomas De La Hunt and Frank F. Taylor have been appointed by H. C. Sheridan, referee in bankruptcy, to take an appraisement and inventory of the property of the De Tamble Motors Company at Anderson, Ind. When the appraisement and inventory is completed, the property will be offered for sale. J. C. Teegarden was recently appointed trustee to represent about \$75,000 worth of unsecured claims against the company.

New Agencies Established During the Week

PLEASURE CARS

Place	Car	Agent
Albany, N. Y.	Franklin	Clarence G. Heck.
Aledo, Ill.	Moon	E. B. Miller.
Anaheim, Cal.	Henderson	P. J. Weisel & Co.
Baltimore, Md.	Stutz	Stutz Sales Co.
Buffalo, N. Y.	Wagenhals	Edgar C. Messersmith.
Butte, Mont.	Packard	Montana A. Gar. Co.
Calvert, Tex.	Henderson	G. T. Bergeson.
Cambridge, Md.	Marathon	E. J. Brannock.
Canton, O.	Moon	Auto Service Co.
Cincinnati, O.	Havers	Western Motor Car Co.
Columbus, O.	Abbott-Detroit	Snyder Automobile Co.
Columbus, O.	Bergdoll	Kaiser Motor Car Co.
Columbus, O.	Flanders	Everett Auto Sales Co.
Columbus, O.	Hupmobile	Kaiser Motor Car Co.
Columbus, O.	Oakland	Oscar Lear M. C. Co.
Columbus, O.	Locomobile	Engle & Vincent.
Columbus, O.	Oldsmobile	Oscar Lear M. C. Co.
Columbus, O.	Premier	Edward Miller.
Columbus, O.	Vellie	Engle & Vincent.
Cuyahoga Falls, O.	Henderson	Falls Auto & Sales Co.
Danville, Ill.	Henderson	D. D. Snyder & Co.
Decatur, Ill.	Moon	North Main St. Gar.
Easton, Md.	Ford	H. E. Clark & Co.
Fall River, Mass.	Franklin	Eckberg & Place Garage Co.
Fargo, N. D.	Henderson	Bergen Auto Co.
Fond du Lac, Wis.	Hupp	E. W. Clark M. Co.
Fond du Lac, Wis.	Jackson	E. W. Clark M. Co.
Frederick, Md.	Krit	H. A. Hann.
Frederick Co., Md.	Paige-Detroit	James E. Solt.
Grand Rapids, Mich.	Henderson	W. S. Farrant.
Harrington, Wash.	Chalmers	J. Thompson & Son.
Haines City, Fla.	Henderson	Wynn W. Scott.
Houston, Tex.	Moon	Northrup & Clark Co.
Lancaster, Pa.	Henderson	Auto. & Supply Co.
Lordsburg, Cal.	Henderson	Williams Bros.
Madison, Wis.	Chalmers	Hokanson Auto Co.
Mechanicsburg, Pa.	Kline	Charles Schroeder.
Menasha, Ill.	Rambler	George Wendel.
Miami, Fla.	Henderson	Dr. Chas. L. Wetzel.
Milwaukee, Wis.	King	Hustis Bros.
Milwaukee, Wis.	Stevens-Duryea	Hustis Bros.
Milwaukee, Wis.	Studebaker	J. G. Wolleager Co.
Minneapolis, Minn.	Stevens-Duryea	J. P. Snyder A. Co.
Moneta, Ia.	Moon	Louis Ruwe.
Monroe City, Miss.	Henderson	Monroe City Auto Co.
Montgomery, Ala.	Henderson	H. L. Hattermer.
Montreal, Que.	Cole	Royal Auto Co.
Pacific Grove, Cal.	Henderson	H. Nuttall.
Petersburg, Va.	Moon	Wm. P. Atkinson Co.
Philadelphia, Pa.	Pope-Hartford	Wallace Auto Co.
Phillipsburg, Pa.	Kline	H. B. Scott.
Phoenix, Ariz.	Hupmobile	J. S. Morrison.
Salisbury, Md.	Henderson	F. J. Adams.
Saranac Lake, N. Y.	Henderson	H. J. Morse.
San Francisco, Cal.	Kline	Frank O. Renstrom & Co.
Savannah, Ga.	Kline	Edward J. Thompson.
Seattle, Wash.	Pathfinder	Van Brunt M. C. Co.
South Bend, Ind.	Franklin	Warde L. Mack.

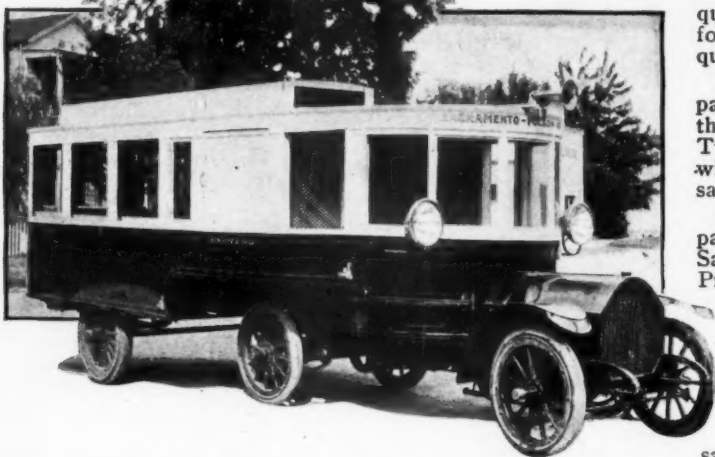
Place	Car	Agent
Steelton, Pa.	Kline	Bartram Shelly.
St. Louis, Mo.	Marion	Neustadt Automobile & Supply Co.
St. Louis, Mo.	Speedwell	Meyer-Rusch Automobile Co.
St. Paul, Minn.	Premier	Norton & Bingham.
St. Paul, Minn.	Premier	Central Auto Co.
Stockton, Cal.	Henderson	S. F. Ruff.
Toronto, Can.	Moon	Auto. Sales Co., Ltd.
Toronto, Ont.	Regal	Ross Motor Car Co.
Ventura, Cal.	Henderson	Wesley B. Parker.
Washington, Mo.	Moon	C. A. Krumsick.
Waynesboro, Ga.	Henderson	R. C. Neely & Co.
Wilkes-Barre, Pa.	Henderson	J. D. Hershberger.
Winnipeg, Man.	Cole	Breen M. Co.
Youngstown, O.	Moon	Regal Sales Co.

COMMERCIAL VEHICLES

Albany, Ore.	Federal	Barrett Bros.
Austin, Tex.	Federal	Ben M. Barker.
Bakersfield, Cal.	Federal	Ben L. Brundage.
Boise, Idaho.	Federal	Wade & Adelman.
Boston, Mass.	Federal	E. Whitten.
Cincinnati, O.	Federal	Cincinnati Motor Car Co.
Connellsville, Pa.	Federal	Connellsville Garage.
Denver, Colo.	Federal	W. W. Barnett.
Detroit, Mich.	Federal	Thompson Auto Co.
Fitchburg, Pa.	Federal	Robert W. Powers.
Fresco Co., Cal.	Federal	W. Hobson Co.
Grant's Pass, Ore.	Federal	Allen & Dunn.
Greenville, S. C.	Federal	W. Conway Thompson.
Hollywood, Cal.	Federal	J. E. Carroll.
Hamburg, N. Y.	Federal	D. W. Brodbeck.
Houston, Tex.	Federal	Alamo Automobile Co.
Imperial, Cal.	Federal	Edgar Bros.
Independence, Ore.	Federal	Ianna Bros.
Long Beach, Cal.	Federal	McKenzie & Bellows.
Los Banos, Cal.	Federal	V. M. Roberts.
Minneapolis, Minn.	Federal	Pence Auto Co.
Newark, N. J.	Federal	J. F. Adams & Co.
New Orleans, La.	Federal	Fairchild Auto Co.
Pomona, Cal.	Federal	Whip & Zander.
Poughkeepsie, N. Y.	Federal	C. B. Kelly.
Reno, Nev.	Federal	I. R. Wainwright.
San Antonio, Tex.	Federal	Alamo Automobile Co.
Santa Ana, Cal.	Federal	C. W. Neely.
San Diego, Cal.	Federal	Tunt Auto Co.
San Jose, Cal.	Henderson	I. Ramselius.
Salem, Ore.	Federal	B. C. Boedigheimer.
Salt Lake City, Utah	Federal	Theeseman Auto Co.
Springfield, Mass.	Federal	Fitchburg Hardware Co.
St. Louis, Mo.	Brown	Meyer-Rusch Automobile Co.
Stockton, Cal.	Federal	Sampson Iron Works.
Tacoma, Wash.	Federal	W. J. Pruitt.
Taunton, Mass.	Federal	Pacific Car Co.
Union, N. J.	Federal	Union Auto Co.
Ventura, Cal.	Federal	R. C. Dennison.
Watsonville, Cal.	Federal	H. G. Brewington Co.
Whittier, Cal.	Federal	Saunders Bros.

In the oil fields it is getting to be quite a common occurrence to see the shooter drive up to a well on his motor-driven shooting wagon. The trucks used by the American Glycerin Company have a carrying capacity of 720 quarts of nitro-glycerin in addition to the shells used for lowering the explosive into the well. From records kept on the operation of these trucks, it is found that about two-thirds more work can be accomplished than was formerly taken care of by horses. These trucks are from the factory of the Adams Brothers Company, Findlay, Ohio, and outside of specially built bodies the balance of the car is the Adams stock chassis.





Novel Locomobile stage coach in service between Sacramento and Folsom, Cal. It makes two trips a day, averaging 90 miles

Bendel Supplants Bremer—M. D. Bendel has succeeded F. G. Bremer as manager of the Twitchell-Gauge Company, Chicago, Ill.

Elmer Leaves Grant—H. H. Elmer, general manager of the Grant Motor Car Company, Cleveland, O., has severed his connection with that concern.

Automobile Value Placed—The basis of valuation of an automobile has been placed at \$600 for Oshkosh, Wis., cars and \$300 for those owned in the country districts.

Schwartz Resigns—A. E. Schwartz has resigned as general manager and treasurer of the Bergdoll Motor Car Company, New York City. His resignation takes effect on November 7.

Baker Increases Space—Additional show room quarters for the Baker electric, Philadelphia, Pa., have been established at 1927 Market street by the Carroll A. Haines Company.

Goes to Olympia Show—R. M. Lockwood, manager of the foreign department of the Regal Motor Car Company, Detroit, Mich., has gone to England to attend the Olympia Show in London.

Moline Self-Starter Equipped—The Moline Automobile Company, East Moline, Ill., will equip its 1913 car with an electric self-starter and lighting system, each operating independently of the other.

Alco Moves—The Longstreth Motor Car Company, Philadelphia, Pa., dealers in the Alco line, will about November 15 remove to the company's new sales and service building, 2126-28-30 Market street.

Smith-Milwaukee Delivery—The A. O. Smith Company, of Milwaukee, Wis., has just made delivery of a squadron of four Smith-Milwaukee worm-drive trucks to The Texas Company at its Chicago, Ill., branch.

Buick Show a Success—The second annual show inaugurated by the Boston branch of the Buick Motor Company closed last week and it proved a success. Other dealers are thinking of doing the same thing during the fall season.

Lee Tire in West—The Lee Tire & Rubber Company, Conshohocken, Pa., will be represented in the West by Chanslor & Lyon, whose branches are at San Francisco, Cal.; Los Angeles, Fresno, Portland, Ore.; Seattle and Spokane, Wash.

Kliesrath Visits Europe—V. W. Kliesrath, chief engineer of the Bosch Magneto Company, New York City, will sail for Europe November 7. He will make the rounds of the automobile factories and incidentally visit both the London and the Paris shows.

L. A. Austin Resigns—L. A. Austin has resigned his position as sales manager and advertising manager of the Rutenber Motor Company, Marion, Ind., to take effect November 1. He will be connected in the future with the Mais Motor Truck Company, Indianapolis, Ind.

Chief Instructor Engineering—Mr. Julian Chatel, the general manager of the Rochet-Schneider car agency of Canada, has been appointed chief instructor of automobile engineering and mechanics in connection with the Montreal Technical High School.

Stewart District Managers—The Stewart Motor Corporation, Buffalo, N. Y., has appointed E. E. Dennison district manager for Illinois, eastern Iowa and Missouri, with head-

quarters at Chicago, Ill., and W. T. Butler, district manager for New York state and northern Pennsylvania, with headquarters at Buffalo.

Lozier Acquires Property—The Lozier Automobile Company, Philadelphia, Pa., has acquired by a long term lease the stable property, 66 feet by 184 feet, at the corner of Twenty-first and Ludlow streets. Approximately \$40,000 will be expended to reconstruct the building for automobile sales purposes.

Piggins Factory Branch—The Piggins Motor Truck Company, of Racine, Wis., has established a factory branch in San Francisco, Cal., to take care of the entire Pacific coast. President E. N. McNab, now in that city, has appointed J. I. McLaughlin manager. Arrangements are now being made for the erection of a permanent building on Golden Gate avenue.

Johnson Sales Manager—W. C. Durant, vice-president of the Republic Motor Company, Detroit, Mich., has appointed Ted Johnson as general sales manager, with headquarters at Detroit. He will have entire charge of sales for the Chevrolet Motor Company and Little Motor Car Company and for all of the subsidiary companies of the Republic Motor Company.

New Frisco Insurance Company—The American Automobile Insurance Company has entered the San Francisco, Cal., field to make a strong bid for the automobile insurance business, the major portion of which has long rested with the Fireman's Fund Insurance Company, a California corporation. The American Company has appointed J. W. Francis manager here.

Locomobile's Stage Coach—Unique in appearance is the Locomobile stage coach in service between Sacramento and Folsom, Cal. This stage, known as the Sacramento-Folsom Air Line, is in daily use between these two points, making two trips a day, averaging about 90 miles. The total weight of the conveyance is 6,000 pounds and the extreme length 24 feet. The accompanying illustration shows the car.

Automobile Incorporations

AUTOMOBILES AND PARTS

ACTON, O.—Davis King Company; capital, \$200,000; to deal in automobiles. Incorporators: A. W. Davis, Hobart E. Mead, B. A. King.

AKRON, O.—Akron Welding Company; capital, \$10,000; to manufacture and deal in automobiles. Incorporators: Milton N. Smith, George D. Stiver, Edward H. Boylan, David H. Morgan, Lucile H. Smith.

BOSTON, MASS.—Ultra Motor Car Company; capital, \$100,000; to deal in automobiles. Incorporators: R. H. Randall, Elisha A. Bragg, C. A. Parker.

BUFFALO, N. Y.—Lafayette Motor Sales Company; capital, \$10,000; to sell automobiles. Incorporators: Frank J. Batt, Annie E. Groh.

CAMDEN, N. J.—Hendricks Manufacturing Company; capital, \$250,000; to deal in automobiles and accessories. Incorporators: F. R. Hansell, John A. MacPeak, F. S. German.

CLEVELAND, O.—Perrine Manufacturing Company; capital, \$10,000; to manufacture and deal in automobiles. Incorporators: R. A. Wilbur, Charles S. Wather, H. H. Burton, Benjamin A. Gage, A. S. Dole.

DETROIT, MICH.—Sprung Carburetor & Clutch Company; capital, \$45,000 to engage in the manufacture of automobile parts. Incorporators: William Healy, J. S. Kennary.

DETROIT, MICH.—Tyro Manufacturing Company; capital, \$5,000; to manufacture automobiles. Incorporators: Roy I. Wellington, William C. Stuart, F. J. B. Gerald.

HATTIESBURG, MISS.—Hattiesburg Automobile Company; capital, \$10,000; to deal in automobiles. Incorporators: M. D. Fohey, H. S. Buscher, Charles Ehlers.

LOUISVILLE, KY.—Highland Motor Transfer Company; capital, \$5,000; to deal in automobiles. Incorporators: John Rommel, C. P. Schillinger, Conrad H. Gutermuth.

LOUISVILLE, KY.—Southern Motors Company; capital, \$100,000; to deal in automobiles. Incorporators: A. T. Hart, Richard V. Look, Graeme G. Bolts, Raynald Whitehand, A. L. McCormick.

MADISON, N. J.—Michigan Motor Sales Company; capital, \$10,000; to deal in motor vehicles. Incorporators: Elmer L. Reynolds, Alvah L. Reynolds, Clara Reynolds.

MEMPHIS, TENN.—P. R. Flanigan Automobile Company; capital, \$10,000; to deal in automobiles. Incorporators: P. R. Flanigan, J. J. Carrigan, T. M. Scruggs.

MENOMINEE, MICH.—D. F. Poyer Company; capital, \$75,000; to manufacture motor trucks. Incorporator: D. F. Poyer.

MT. EATON, O.—Mt. Eaton Supply Company; capital, \$60,000; to deal in automobiles, implements, etc. Incorporators: J. A. Yohn, F. B. Schlaafy, Charles L. Schaffer, Robert Kenwell, Albert Pfister, Ira C. Wellbaum.

NEW YORK CITY, N. Y.—A. M. A. Company, Inc.; capital, \$5,000; to deal in motors, engines, etc. Incorporators: N. Pohly Myers, Walter C. Allen, Harry N. Allen.

PETROLIA, ONT.—Petrolia Motor Car Company, Ltd.; capital, \$300,000; to manufacture automobiles. Incorporators: William English, Charles H. Metcalf, John A. McKenzie.

ST. LOUIS, MO.—Brashear Truck Company; capital, \$5,000; to deal in motor trucks. Incorporators: Boyle O. Rides, Lewis S. Haslam.

WASHINGTON, D. C.—Croton Motor Car Company; capital, \$300,000; to manufacture automobiles. Incorporators: J. P. Stoltz, A. M. Linn, J. D. Bigger, J. I. Brownson, J. H. Donnan, H. C. Warne, C. S. Caldwell, G. W. Dudderar, R. M. Paxton.

Bretz Off to Europe—J. S. Bretz has sailed for Germany, where he will visit the F. & S. bearing factory at Schweinfurt.

Leech Manager Oakland—E. K. Leech has been made manager of the new Oakland branch in Philadelphia, Pa.

Essenkay's Houston Office—The Essenkay Sales Company has established a Houston, Tex., office at 217 Carter Building with H. H. Hassel as manager.

Increasing Repair Facilities—The E. W. Clark Motor Company, of Fond du Lac, Wis., is planning to considerably increase its storage and repair facilities.

Gotshall in St. Louis—N. S. Gotshall has been shifted from traveling representative for the Lozier interests to manager of the St. Louis company, St. Louis, Mo.

Establish Louisville Office—Wilcox Brothers, who have secured the agency for Fisk tires in Louisville, Ky., have established an office and salesroom at 941 1-2 South Third avenue.

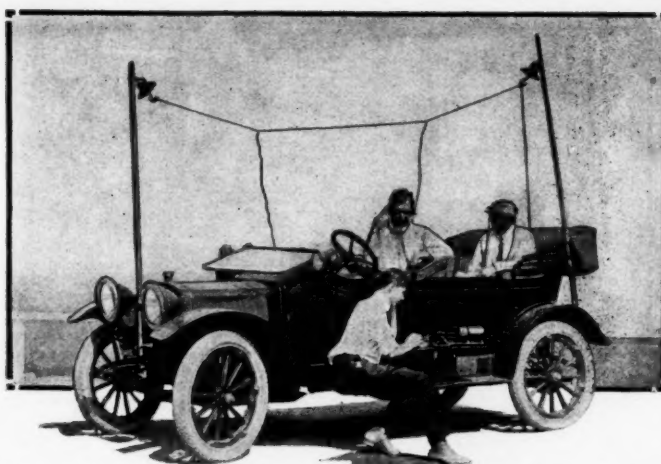
Anderson Heads Ford Branch—W. C. Anderson is to have charge of the Ford branch which opened October 1 in Minneapolis, Minn. He will have charge also of the St. Paul sub-branch.

Averill Resigns—H. R. Averill, who has been connected with the Pullman Motor Car Company, of York, Pa., for 6 years as general sales manager, has resigned, resignation taking effect November 1.

Automobile at Dairy Show—A number of enterprising Milwaukee, Wis., dealers are making automobile exhibits at the International Dairy Show which is being given in the Auditorium from October 22 to October 31, inclusive.

Phipps Electric Organized—The Phipps Electric Automobile Company has been organized in Detroit, Mich., by Joel G. Phipps for the purpose of manufacturing electric automobiles. Mr. Phipps was formerly general manager of the Grinnell Electric Car Company.

Hay Leaves Ford—Thomas J. Hay, who for 7 years was manager of the Chicago branch of the Ford Motor Company,



R. C. H. car used by E. C. Hanson, of Los Angeles, in recent wireless telephony experiments between Lookout Mountain and Long Beach

recently created a sensation among the local trade by retiring from his position. Dayton Keith, who has been Indianapolis manager of the Ford company, has been named as his successor.

Puncture Company Incorporated—The Detroit Puncture Company was recently incorporated in Detroit, Mich. The officers of the concern are: M. H. Chamberlain, L. N. Taylor and K. R. Montgomery. The concern manufactures a tire compound which is intended to heal punctures and cuts in the envelope.

Will Silence Critics—The permanent improvement plan of Milwaukee county, Wis., is elaborate and will silence critics, who declare that Milwaukee county's highways are not only the worst in America, but there seems to be no inclination to improve them. The 12 miles of concrete road built this year will be increased to 52.

Paducah Automobile Service—A daily automobile service has been established between Paducah and Roaring Springs, 40 miles. The Quanah, Acme & Pacific Railroad is now being extended from that place to Roaring Springs and the automobile service will be operated between the two points until the railroad is finished.

Birmingham Cars Tour—Eighteen cars from Birmingham, Ala., took part in the second Birmingham-Meridian tour. The visitors were met at Livingston, Ala., by twenty-five Meridian cars who escorted the guests into the city. All the whistles in the city were tied down and a rousing welcome accorded the Birmingham people.

Lacroix Exclusive Agent—Paul Lacroix has signed a contract whereby he becomes exclusive agent in the United States for the Mercedes car. The contract extends to 1920. The headquarters of the new concern, the Mercedes Distributing & Importing Company, of which Mr. Lacroix is president, are at 1770 Broadway, New York City.

Completes Route Marking—The Lake-to-River Road Association, organized recently by Milwaukee, Wis., and other state interests affected by the planning of a good highway across the state of Wisconsin, from Lake Michigan to the Mississippi River, reports that it has completed the marking of the route by means of banding telephone posts, as in Iowa. The distinguishing mark is a white band on each post, a red X being placed in the center.

Hupmobile Wins Award—The final award in the Studebaker-Hupmobile controversy resulting from disqualification of the former car in the annual reliability run of the Minnesota State Automobile Association for leaving the course at Foxhome, Minn., has been made by the contest board of the A. A. A. to the R. W. Munzer & Sons Company, for the Hupmobile. Protest was originally made by the Studebaker corporation. The award carries the Minneapolis Daily News cup for light car class with it.

Shanks Goes East—Charles B. Shanks, who has been appointed general sales manager of the Kelly-Springfield Motor Truck Company, of Springfield, Ill., will leave San Francisco, Cal., for the East to assume the duties of his new position. Shanks is well known in American automobile circles as the former sales manager of the Winton Motor Carriage Company and the F. B. Stearns Company, of Cleveland. Shanks has turned the management of the Kelly motor truck branch in San Francisco over to Frank G. Miner, who has been his assistant.

Automobile Incorporations

WHITE PLAINS, N. Y.—General Rim Company; capital, \$150,000; to deal in automobiles and parts. Incorporators: Robert W. Ashley, Frank Oberkirch, William Kaul.

GARAGES AND ACCESSORIES

ALBANY, N. Y.—Albany Motor Racing Association; capital, \$1,000; to carry on automobile racing. Incorporators: J. D. Keeler, R. P. Keeler, S. H. Shaw.

ALBANY, N. Y.—Carbone Company, Inc.; capital, \$200,000; to deal in all kinds of rubber tires, etc. Incorporators: W. E. Greene, G. C. Leonard, W. G. Van Loon.

BUFFALO, N. Y.—Frontier Garage & Livery Corporation; capital, \$25,000; to conduct a general garage business. Incorporators: Francis L. Hoff, Giles G. Meinell, George P. Mitchell.

CHICAGO, ILL.—Auto Combination Lock Company; capital, \$50,000; to manufacture automobile supplies. Incorporators: H. M. Snow, H. L. Mason, F. W. Robinson.

CHICAGO, ILL.—M. R. L. Resilient Tire Company; capital, \$25,000; to manufacture automobile supplies. Incorporators: L. M. R. Labee, M. O. Lundholm, R. W. Moore.

DETROIT, MICH.—Baid Sales Company; capital, \$10,000; to manufacture and deal in automobile accessories. Incorporators: W. C. Chapman, R. P. Baubie, G. A. Breeze.

MOUNT VERNON, N. Y.—Mount Vernon Auto Express Company; capital, \$1,500; to carry on an automobile express business. Incorporators: Luci Jacobsen, Elizabeth Jacobsen, Fred Cardillo.

NEW YORK CITY, N. Y.—Cathedral Park Garage, Incorporated; capital, \$1,000; to carry on a general garage business. Incorporators: Morris Klein, Samuel Klein.

NEW YORK CITY, N. Y.—Columbia Taxicab Company; capital, \$5,000; to conduct a general taxicab business. Incorporators: John Graham, James Pathe, Patrick Garrity.

NEW YORK CITY, N. Y.—Globe Tire Company; capital, \$500; to manufacture tires. Incorporators: Ralph W. Morrison, R. D. Placak, F. F. Nichols.

NEW YORK CITY, N. Y.—Hallett Point Garage, Inc.; capital, \$5,000; to conduct a general garage business. Incorporators: August Kiel, Jr., Thomas D. Tompkins, Gustave Rees.

PADUCAH, KY.—Henry Brothers Taxicab Company; capital, \$200; to conduct a taxicab business. Incorporators: Finis Henry, Toy Henry, E. E. Henry.

TORONTO, CAN.—Auto Top & Buggy Company, Ltd.; capital, \$200,000; to manufacture automobile tops, etc. Incorporators: James E. Day, John M. Ferguson, Edward V. O'Sullivan.

CHANGES OF NAME AND CAPITAL

CANTON, O.—Knight Tire & Rubber Company; increase of capital from \$500,000 to \$1,500,000.

LOUISVILLE, KY.—Kentucky Automobile Company; increase of capital from \$65,000 to \$100,000.

PORT HURON, MICH.—Havers Motor Car Company; increase of capital from \$115,000 to \$175,000.

TOLEDO, O.—McNaull Automobile Tire Company; increase of capital from \$50,000 to \$75,000.

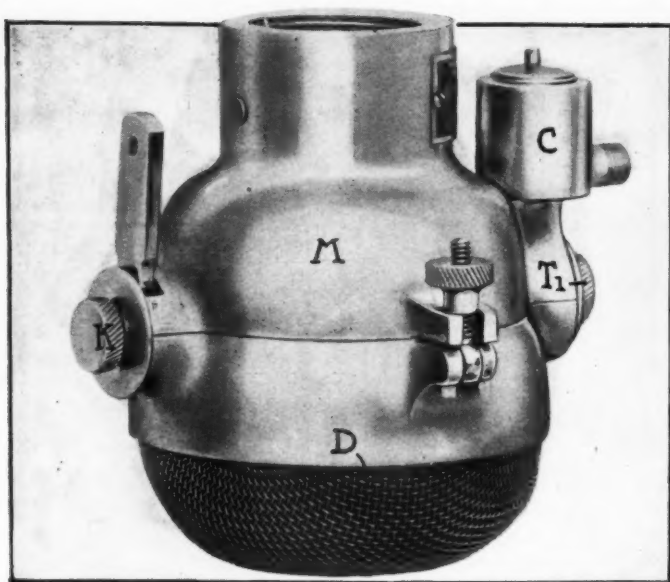


Fig. 4—Side view of fully assembled A. B. C. carburetor

A. B. C. Carburetor Has No Adjustments

Constant Ratio of Mixture Is Obtained
By the Use of Co-operating Float
Chamber and Throttle

Multiple-Jet Design Is Claimed to Be Proof Against Leak-
age, Fire, Theft and Clogging Up of Nozzles

AS the result of 2 years' experiments, the International Accessories Company, 115 Broadway, New York City, announces its multiple-jet, adjustmentless, automatic carburetor. This carburetor is, in a large measure, what is ordinarily termed fool-proof; besides it is leakage-proof and backfire-proof. It is composed of three elements, namely, the upper half of the carburetor casing formed in unit with the needle valve casing, the float chamber and the lower half of the carburetor casing which is formed with a double wire screen separating the air space which surrounds the float chamber from the exterior atmosphere.

The construction of these elements is illustrated in the accompanying cross sections, Figs. 2 and 3. The upper casing M is of a conventional concentric-float design and its throat contains a butterfly type of throttle valve. A lateral portion of the part M is bored to receive the vertical downward extension of the needle-valve casing C which contains a weighted needle valve for regulating the admission of gasoline to the float chamber. Gasoline flowing from the tank to the carburetor enters the device at G, passes the needle valve N and then flows down through the passage P formed in the downward extension of the casing C. In this passage a connecting stem S is in place, the upper end of which is secured to the weight resting on the needle valve, while its lower end rests upon that of the float lever. The gasoline coming down through P enters the float chamber F through the circular bore B, into which the extension of the valve casing fits.

The float chamber is journaled in lateral, horizontal extensions of the casing, which are cut along the contact line of the upper and lower carburetor-casing halves. To insure tightness between

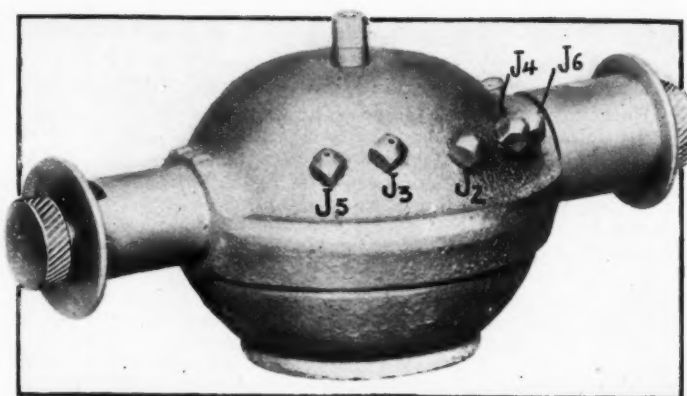


Fig. 1—Float chamber of the A. B. C. automatic carburetor

the passage P and the bore B of the float chamber, the sleeve S1 formed with a knurled screw head is used as a bearing for this end of the float chamber axis. Fig. 2 shows that this end of the float chamber is made open, but is closed in practice by a plug formed on S1. The float F1 is made up of laminated cork which, according to the company's tests, has not absorbed any gasoline through 18 months of continued service, this being the greatest endurance test made with the A. B. C. carburetor. The float is held concentric with respect to the vertical axis of the chamber by a rod R which is bored down from its upper end to the depth of about 1 inch. The single float lever is securely fastened to the float and is fulcrumed at F2, so that its free end is always under the weighted stem of the needle valve. By this expedient the stem is made to follow at all times the end of the lever, so that when the fuel has reached the proper level in F the float is lifted, the end of the float lever depressed and the needle valve closed due to the weight of the needle N and the stem S.

The proper level of fuel in the float chamber is that of the highest spraying jet in action for a given position of the throttle. Reference to Fig. 2 brings out the fact that the operating lever O which fits into the right equatorial extension of the float chamber at the same time tilts that chamber and the throttle T, Fig. 3, which is connected to it through the hooked rod H fitting in the bore of rod R. At the approximate level of the bore B the float chamber carries six small plugs formed in its surface, which are bored for minute passages varying in diameter from .014 to .022 inch, in case of a 1.25-inch carburetor. Five of these bored plugs or nozzles are disposed on one side of the float chamber and the sixth on the other. All these nozzles act as outlets for the fuel jets; but the nozzle which is on one side, is distinguished by its double office of low-speed and compensating jet. This nozzle is fitted, inside the chamber, with a thin pipe extending down to the level L1, whereas the other five nozzles are not continued inside the float chamber.

Air Enters Through Double Screen

Before taking up the manner of operation of the several jets, it should be noted that the air passing through the carburetor enters through the double screen D, Fig. 2, which is made of one layer each of fine and coarse wire. All this air passes around the equatorial belt of the float chamber before going through the throttle; and as the float chamber and the throttle are tilted at the same time and by the same means, it has been possible to so dimension these parts that the horizontal cross section of the throttle opening is at all times equal to that formed between the float chamber and the carburetor casing. In this way, unlike other types of carburetors, the A. B. C. device is of adjustable size, being, for various throttle openings, a .125, .25, .5, .875 or 1-inch carburetor. The capacity of the air intake is always equal to that of the throttle.

When the opening of the throttle is a minimum, only the low-speed nozzle comes into action, resulting on the use of a single jet. The gasoline evaporated at the mouth of this nozzle is

sucked up by the vacuum effect of the suction strokes of the motor, and is atomized by this suction only, as it is forced out through the minute bore of the nozzle. A thickening of the float chamber casing just below the slow-speed nozzle protects the latter from direct contact with the air sucked into the motor, the gasoline leaving it only on account of the pressure in the throttle passage, which is below atmospheric. As soon as the float chamber is tilted further, however, not only are the throttle and carbureter openings increased, but the nozzles for the higher speeds jets, J2, J3, J4, J5 and J6, Fig. 1, are lowered and immersed in the fuel in the order of the jets named. The air passing them sucks out and atomizes the fuel supplied by them. These five nozzles are of different bore and consequently capacity, so that they provide the various correct gasoline-air ratios necessary to give efficient combustion at the various motor speeds. After J6 has been brought into action, if the throttle is opened further, the opening around the float chamber becomes wide enough that a considerable air current rushes past the slow-speed nozzle and increases the fuel delivered from it, by adding its jet-blower effect to the pure vacuum effect of motor suction exerted before.

A peculiar feature of this float chamber construction is that, due to the location of all nozzles well above the bottom of the chamber, no water or sand is able to clog up the jets. The makers state that this has been borne out by numerous tests, and that as much as a teaspoonful of sand and a tablespoonful of water did not in the least alter the behavior of the carbureter. In addition to this feature it should be noted that the removal of foreign matter from the float chamber is an extremely simple undertaking. As the bore B has as much capacity for outgoing matter as for incoming, water and sand are easily passed out through it after the float chamber has been taken out of the carbureter casing.

That this is a simple matter and the work of but a few seconds, will be shown at once. A pair of eyebolts fitted with thumbnuts and attached at diametrically opposite points of the lower half of the carbureter casing are fastened to the upper casing half as shown in Fig. 4. By loosening both thumbnuts and tilting down the eyebolts, the lower half carrying the screen may be taken off and the float chamber including sleeve S1, the lever O, and the screw K, Fig. 2, removed, after disconnecting the hook H from the eye of the throttle lever L, Fig. 3. It is now easy to spill the contents of the float chamber through the above-mentioned bore.

A nice feature which ought to appeal to tourists deserves to be mentioned in this connection. As the float chamber is re-

moved, the needle and its stem drop, thereby shutting off the gasoline supply. This has not only the advantage, that it becomes unnecessary to turn off the gasoline cock, but presents a possibility of leaving the car alone on the road, if necessary, it being impossible to start the motor except by replacing the float chamber or the whole carbureter.

Another point of interest lies in the fact that no impurities may enter the carbureter except by way of the gasoline line. All air is passed through the double screen D, Fig. 2, one layer of which is of 16-mesh and the other of 50 mesh. The main purpose of this screen, however, is to prevent the spreading of a flame entering the carbureter as a backfire from the motor. The principle applied is the same as used in the miners' lamp, and as tests have demonstrated is equally efficient in both cases.

Excepting the steel wire screens and the cork float, almost all the parts of the A. B. C. carbureter are made of brass. An exception is the needle valve; this part is made at present of German silver as well as of Monel metal, an alloy closely related to the one first named. The company has not yet decided which metal will finally be adopted for the manufacture of all needle valves.

Carbureter Is Flexible and Efficient

The perfect automatic working and the absence of adjustments having been elucidated above, it remains to state that numerous tests have created what must be called a favorable impression with those present at such tests. The carbureter proved both flexible and efficient. Its weight is small, being, for example, 4 pounds for the 1.5-inch size. The A. B. C. is made in the following sizes: 1 inch, 1.25, 1.5, 1.75 and 2 inches.

The method of installing this carbureter is slightly different from the ordinary process, due to the different shaping of the throttle portion of the casing. As the latter is not formed with an integral flange, as is the case with most other designs, it is necessary to use a flanged connection attaching to the manifold, which fits around the threaded neck of the throttle extension of the casing. If the carbureter is specially made for any given make of car, it may, of course, be furnished with a flange if it is so desired, or the manifold throat may be so designed as to directly take in the throttle portion of the carbureter.

The few parts of which the carbureter is made are manufactured standard and in large quantities, so that they may be replaced if necessary. Tests made to examine the interchangeability of parts and its effect on engine operation, and these have developed the fact that the changes made did not produce any appreciable change in the operation of the engines tested.

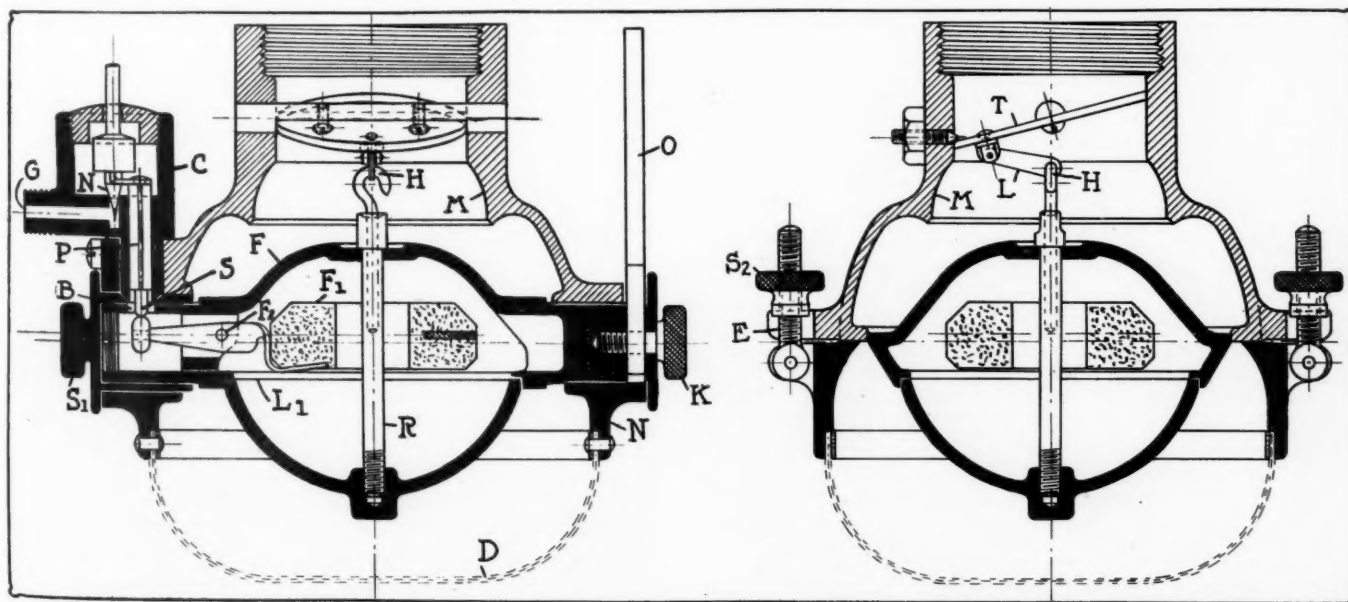


Fig. 2—Longitudinal section of A. B. C. carbureter

Fig. 3—Transverse section through A. B. C. carbureter

Newest Ideas among the Accessories

Moore Automobile Jack; Continental Electric Horn; Novel Rim-Removing Tool; Grossman Connectors and Windshield Cleaner; Tyre-Tonic; New Wrenches and Pliers; Endura Packing; Sealo Puncture Preventative

Moore Tire-Saving Jack

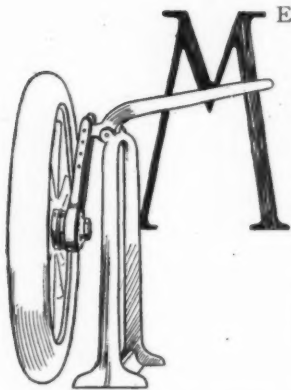


Fig. 1—Moore tire-saving Jack

tion by the action of a pawl dropping into a ratchet carried on the pivot which serves as fulcrum for the lever.

Continental Vibrator Signal

The Motor Car Equipment Company, 55 Warren street, New York, has just brought out a vibrator-operated electric horn, which, as may be seen in Fig. 2, is of extremely simple design. There are no square portions in either the horn casing or the sound intensifier, which gives the signal of peculiar appearance. The overall length of the horn is 10.5 inches and the diameter of the intensifier 5.5 inches. In the view of the vibrator mechanism the simple construction of this part of the horn is evidenced; the mechanism consists of a small electro-magnet mounted on a case baseplate B and fitted with an armature A, which is carried on a vibratory steel sheet S. The latter is in metallic contact both with the horizontal part H of the base casing and with the angle A1 insulated from H by rubber washers. A1 is fitted with a screw S1 contacting with S normally. Current is admitted to the horn by means of the two contacts C and C1; a wire leads from C to the contact screw on the baseplate, which is insulated from the latter. Both vibrator coils are connected in parallel, thereby producing a strong magnetic field, when the circuit is closed by pressing a button. The path of the current is from C to the contact screw, through both coils and a wire up to A1, through S1 to A, S, H and B, whence it grounds back to C1. As soon, however, as the coil is magnetized by the current passing through it, the armature A is attracted, and the current being interrupted at the former point of contact between S and S1 permits of the armature being returned through the spring action of the steel sheet S. Every time the armature is attracted by the magnet it strikes the rod R, which is fastened to the diaphragm, thereby producing an impact.

Perfection Rim Remover

The Perfection Manufacturing Company, New Martinsville, W. Va., has designed a tool for the removal of a rim in a quick and easy manner. This tool is made of one piece of steel pressed at both ends with heads and beaks like bird heads. The beak portions permit of wedging the tool under the ends of the locking ring as well as for lifting up the tire so that the valve comes clear out of the hole. The tool and its application are so simple that its use is clear from the illustrations, Figs. 6 and 7.

Grossman Novel Accessories

The Emil Grossman Company, 250 West Fifty-fourth street, New York City, have added several new accessories to their line, and among these the special ignition assembly and the Security windshield cleaner, Figs. 5 and 6, are of such nature as to command especial interest. The former accessory represents a new and handy method of providing connections between distributor posts and of averting short circuits in the line, while the latter insures a clear windshield in rainy weather.

As Fig. 5 of the Red-Rib Ignition Wire Assembly shows, this outfit is composed of as many heavily insulated wire leads as there are spark-plugs used in the power plant. The length of each individual lead may be varied depending on the position of the magneto distributor with relation to the engine, and the wires extending from there to the cylinders are held together by rubberized fabric, as far as possible, separating only where a lead branches off to its spark-plug. Under the rubberized binder each

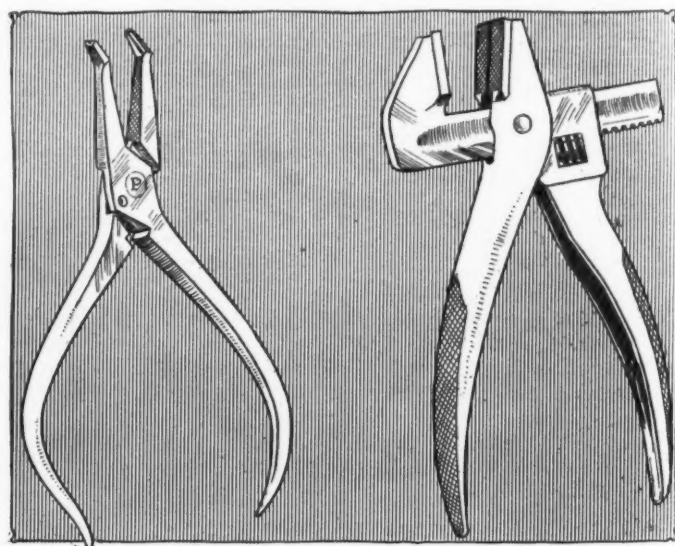
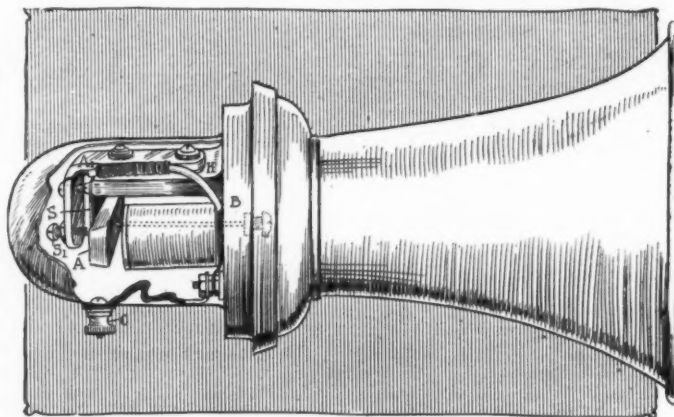


Fig. 2—Continental electric vibrator horn for automobiles
Fig. 3—Mesnard cotter pin pliers. Fig. 4—Starrett tool

wire is surrounded by a substantial rubber coating, and on both ends is fitted with connectors or terminals; two types of terminals are used, one fitting on the binding posts of the distributor and the other of the terminals of the spark-plugs. These respective connectors are also shown in Fig. 5. The assembly may be produced to fit any make of car and any position of the magneto on a car.

The security windshield cleaner consists of a guide, which slides on the horizontal top member of the windshield frame and of a metal rod which is bent, roughly speaking, as a U and attached to the guide. The short leg of the U carried on its end a socket in which a small, spring-urged plug is contained which, when the cleaner is in place in the windshield, bears against the rear side of the pin. It thereby presses the pan against the rubber strip carried in a slotted clamp which is attached to the other leg of the U-member, and which may be moved along the front side of the windshield, cleaning off whatever moisture is there as a consequence of rain. The cleaner may be installed in less than a minute's time, as it merely slips over the top member of the frame and is in no way secured thereto.

Tyre-Tonic Solution

The Sturdy Manufacturing Company, 2637 Michigan avenue, Chicago, Ill., now manufactures a compound which is applied to the face of tires for the double purpose of improving their appearance and filling up small cuts in the tread so that water finds no way into the fabric layers. In this way a repeated treatment with the solution, which comes in cans of various sizes, prolongs the life of a tire, as the fabric is protected from the attacks of mildew, the latter being known as one of the principal reasons of shortened tire life. The compound consists of a carrier solution, which contains rubber and a paint body in suspension, and must be stirred thoroughly before application. The liquid which contains the rubber and paint is inflammable and therefore it is necessary to use caution in handling the solution. The Sturdy company furnishes it in both white and battleship gray.

Turner Improved Pump Cap

The Turner Brass Works, Sycamore, Ill., has made an additional improvement on its line of blowtorches, which facilitates the reinserting of the pump washer after oiling the same. Ordinarily some difficulty is experienced in this work, as the leather washers show a tendency to buckle when reinserted in the pump cylinder after oiling. At present, the pump cap and former, as the new accessory is named, is applied to the leather washer after it has been oiled and within a few seconds the washer is given its exact original shape, so that it may be returned into the pump cylinder without any trouble. Of course the use of this device is not confined to the line of blowtorches, but it should prove equally serviceable to the owners of furnaces.

Mesnard Cotter Pin Pliers

Pliers especially adapted for the inserting and bending of cotter pins have been designed by the Modern Sales Bureau, 1712 Michigan avenue, Chicago, Ill. Under the name of Mesnard's cotter pin pliers this concern markets the small and handy tool shown in Fig. 3, which is tongue-shaped and differs from an ordinary tongue but by the special shaping of its short lever ends. The faces of these short levers are knurled and the extreme ends bent in an angle and formed with a slot for taking in the cotter pin ends. Both pieces—the tool consists of two parts—are held together by a pin P driven through a stout portion formed between the long and short lever ends.

Endura Sheet Packing Material

A departure from packing materials is the new product of the Endura Manufacturing Company, Sixty-third street and Eastwick avenue, Philadelphia, Pa. This packing material comes in sheets of varying thickness, ranging from .015625, to .125 inch, the square yards of sheets having these two thicknesses weighing .75 pound and 6 pounds respectively. Endura is a dark gray material made of vegetable fiber which has been impregnated with inorganic materials; the effect of this treatment being that while the packing is combustible it offers considerable resistance to the heat and does not easily catch fire. It contains neither asbestos nor rubber, is claimed to make an absolutely tight joint and to calk perfectly under the action of water. Due to this property it should not be used in intense dry heat.

Starrett Wrench and Pliers

A clever combination tool, which may be used with equal efficacy as a wrench or as a pair of pliers is shown in Fig. 9, it being the product of the L. S. Starrett Company, Athol, Mass. It is made of hard, nickel-plated steel and consists of three relatively movable portions, the right-angled wrench-and-plier jaw, the straight jaw, which is fitted with a 6-inch handle and a

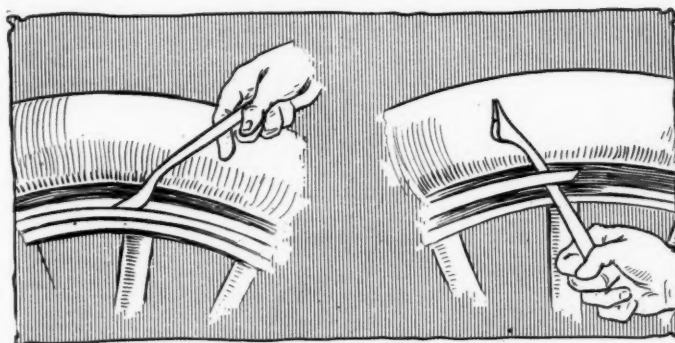
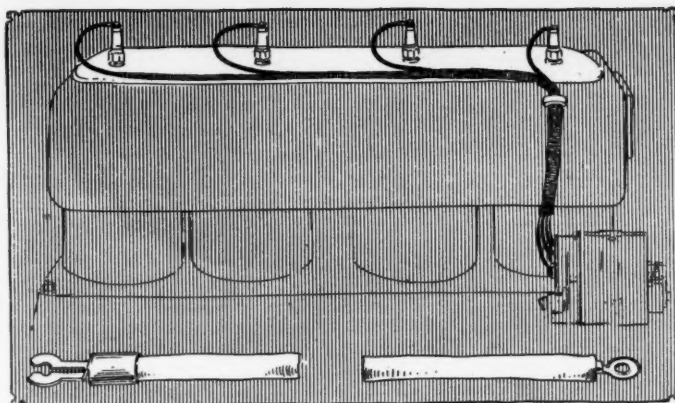
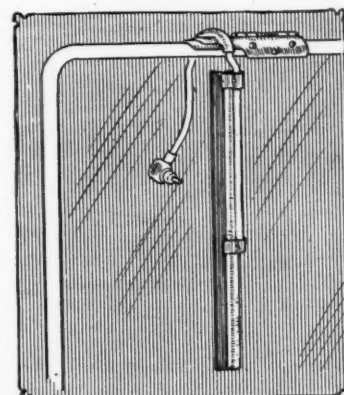


Fig. 5—Red-Rib wire assembly for neat and short-circuit proof conducting of the ignition current to the motor cylinders. Figs. 6 and 7—Two views showing the application of the Perfection tool, in removing the locking ring off a quick-detachable type of rim. The tool may be also used to advantage in taking the tire off and getting the valve out of the rim hole. Fig. 8—Appearance of the Security windshield cleaner for clearing a shield in rainy weather, in place on a windshield of standard design



second handle of the same length, the end of which is formed to be fitted over the extension of the right-angled piece and contains a worm engaging the transverse rack on the underside of the above-mentioned extension. The straight jaw is pivoted through the end of the other handle, so that its angle against the face of the right-angled jaw may be changed, depending on whether the tool is to be used as a wrench or plier. The handles are nicely knurled to give the tool a high-class appearance, and while this aim has been realized throughout, the strength of the device is fully up to the requirements of any work to which its size permits it to be put.

Sealo Pneumatic Tire Treatment

To prevent puncture troubles, the Sealo Tire Company, 1409 Michigan avenue, Chicago, Ill., has compounded Sealo, a liquid which is injected into the inner tube to prevent the air from escaping therefrom, even should the rubber wall be pricked by a pointy object. Sealo is injected into the tube, through the valve stem and by means of a special gun, and when in the tire covers the entire inner surface of the tube, while it retains at all times its liquid state. When the tube is punctured, the outward pressure of the compressed air forces Sealo into the wound, thereby plugging up the same and preventing the air from leaving the tube.

Claudel Carburetor Handled Here

IN THE AUTOMOBILE of October 31, the address of the Claudel Carburetor Company in Paris was stated. This carburetor is handled in this country by D. McRa Livingston, 1784 Broadway, New York City.

Patents Gone to Issue

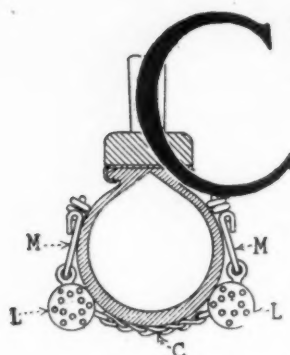


Fig. 1—Simmons anti-skid device

are provided; these means are adjustable and vary proportionately with the throttle opening.

No. 1,042,982—to Leonard Sliger, Indianapolis, Ind. Granted October 29, 1912; filed May 31, 1911.

Anti-Skidding Device—Comprising rubber-covered ball-links which are held tightly against the lateral surfaces of the tire tread.

This patent describes an anti-skidding apparatus consisting of a pair of side links L, Fig. 1, on which flexible balls are formed, the latter being in contact with the side surfaces of the tire tread. The links L are supported on the tire by means M, which in turn are connected by members C extending across the tire, holding opposite links together.

No. 1,042,722—to Turner W. Simmons, Bridgeport, Conn. Granted October 29, 1912; filed November 24, 1911.

Rotary Cylinder Valve—Comprising a valve plug worked out in a number of semi-cylindrical shells, forming communications between motor and manifolds.

This patent refers to a so-called valveless motor, in which the poppet valve is supplanted by a rotary plug valve positioned above the combustion chambers of the motor cylinders, Fig. 3. The valve plug P₁ is contained in a casing C provided with ports P communicating with the cylinders and with inlet and exhaust passages. The valve plug is composed of as many pairs of semi-cylindrical shells as there are cylinders in the engine. There is an inlet and an exhaust shell for each cylinder and they are constructed with openings affording communication with the inlet and exhaust manifolds when they register with the cylinder openings.

No. 1,042,712—to Albert E. Moorhead, assignor to American Rotary Valve Company, Chicago, Ill. Granted October 29, 1912; filed July 28, 1911.

COMPENSATING Carbureter Construction—In which increases of fuel and air are regulated by a connecting mechanism.

The subject matter of this patent, a carbureter, Fig. 2, comprises a fuel chamber C and an atomizing chamber C₂ which extends diametrically across C, a nozzle N projecting from C into C₂. A throttle T is located in one end of the atomizing chamber and a mechanism M is provided, which operates T and N at the same time, thereby maintaining at all speeds an adjusted ratio between fuel and air admitted to the motor. In the end of C₂ opposite to the throttle means for admitting an air current and directing it into the center of C₂

Internal-Combustion Engine—Two-cycle design in which a valve mechanism carried by the crankshaft regulates the passage of mixture from the crankcase to the combustion chamber.

The engine referred to in this patent has a crankcase C, Fig. 4, formed with a cylindrical interior which has a port opening into its cylindrical surface. A working cylinder C₁ is arranged on the crankcase with a piston P in it. In the crankcase a crankshaft S with a crank C₂ is inclosed, being connected to the piston by a rod and carrying a valve structure disposed 180 degrees away from C₂. A semi-annular shoe S₁ is mounted on the valve structure and governs the port through which a fuel mixture enters the crankcase, whence it is passed to the working cylinder.

No. 1,042,970—to William H. Richman, Philadelphia, Pa. Granted October 29, 1912; filed August 25, 1908.

Demountable Rim—Which is carried on the beveled portions of two interlocking felloe rings.

The rim this patent relates to is seen in Fig. 5, being carried on a felloe constructed of a fixed ring R with an annular recess on one side into which fits a removable ring R₁. Screws project through R₁ into R; R₁ has notches formed in it. Pins P in the notches of the fixed ring guide the movable ring into place. Each rim is beveled on one side from its outer to its inner edge, so that a depressed, annular bed is formed between the rings for a rim.

No. 1,042,478—to Albert D. Reid, West Chester, Pa. Granted October 29, 1912; filed May 22, 1912.

Windshield for Automobiles—A V-shaped design which may be tilted forward.

Fig. 6 shows the subject matter of this patent, a V-shaped windshield which is independent of the motor bonnet, above which it is secured. The shield S swings about a rear horizontal axis A and is fitted with a rigid arm F extending forward to a fixed portion of the motor bonnet, to which it may be attached.

No. 1,042,925—to John L. Kennedy, Washington, D. C. Granted October 29, 1912; filed October 6, 1910.

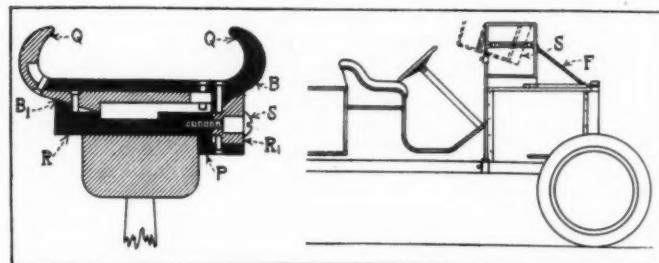


Fig. 5—Reid demountable rim. Fig. 6—Kennedy windshield

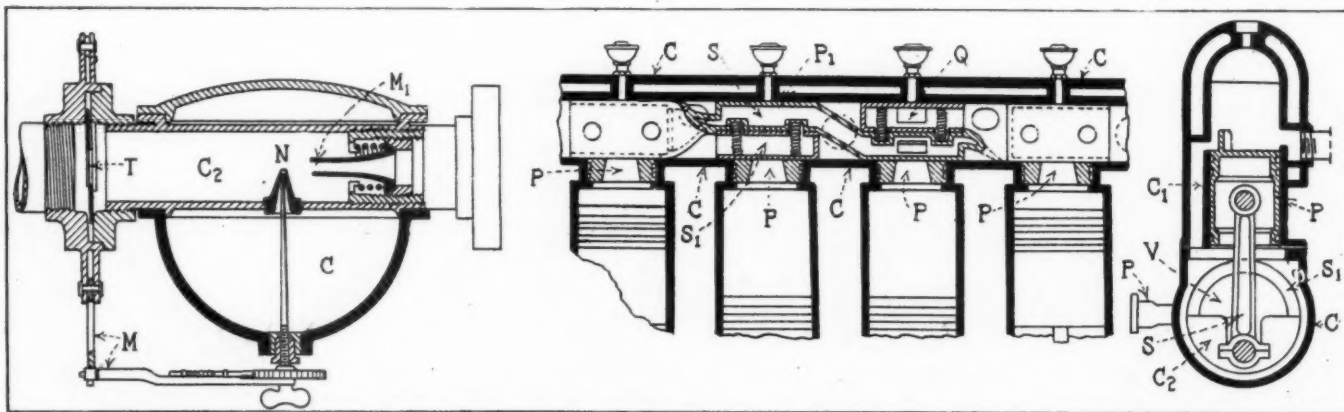


Fig. 2—Sliger carbureter. Fig. 3—Moorhead rotary cylinder-plug valve. Fig. 4—Richman internal combustion engine